Predicting and Explaining Day-to-Day Mineral Water Intake

Results of an investigation into naturally occurring
beverage consumption behavior in a student sample
by means of a 7-day structured diary

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Psychology is the science whose defining duty is the systematic empirical study of mental processes that inform the observable behaviour of individual human beings, and indeed of members of other species. Thus, eating and drinking and thoughts and feelings about foodstuffs and beverages should be one of the major areas of research, teaching and application in psychology.

Curiously, it is not. What we do overtly and in our heads about food and drink has occupied a far lower proportion of psychologists' time, historically and to the present, than the fraction of waking life that people generally spend doing those things. Worse, the research community that specializes in the study of ingestive behaviour has largely been cut off from the main areas of research into human psychology. (Booth, 1994, p. 184)

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List of Abbreviations

AGFI	Adjusted goodness-of-fit index
AIC	Akaike Information Criterion
BMI	Body mass index
	(i.e., ratio of body weight to squared body height: BMI = kg / m^2)
CFI	Comparative fit index
DGE	Deutsche Gesellschaft für Ernährung
FAO	Food and Agriculture Organization of the United Nations
FEV	Fragebogen zum Eßverhalten (Pudel & Westenhöfer, 1989)
FEV scale 1	Scale 1 of the FEV (titled: "Cognitive control of eating behavior, restrained eating behavior"; Pudel & Westenhöfer, 1989)
FNS	Food Neophobia Scale (Pliner & Hobden, 1992)
GFI	Goodness-of-fit index
IDM	Informationszentrale Deutsches Mineralwasser
IEG	Inventar zum Eßverhalten und Gewichtsproblemen
	(Diehl & Staufenbiel, 1994)
IEG scale 1	Scale 1 of the IEG (titled: "Attitude toward eating [Importance of eating]"; Diehl & Staufenbiel, 1994)
NFI	Normed fit index
NNFI	Nonnormed fit index
PWM	Pudel and Westenhöfer's (2003)
	Model of Cognitive Decision Making on Foods
RKI	Robert Koch-Institut
RMS (SRMR)	Root mean square standardized residual
RMSEA	Root mean square error of approximation

SEM	Structural equation modeling
SES	Socioeconomic status
TPB	Theory of planned behavior
TRA	Theory of reasoned action
VARSEEK-scale	Variety-seeking scale (e.g., van Trijp, 1995)
WHO	World Health Organization

Preface

It was several years after I took my exam in psychology when I heard about a field of applied psychology called *nutritional* psychology for the first time. It made me curious because I had already been working in market research on food products for a while at that time, and I started to read an earlier edition of Pudel and Westenhöfer's (2003) textbook. Then, after a while, I began to realize how accurately Booth's (1994, p. 184) statement, which serves as an introductory motto to this text, characterizes the state of affairs which the socioscientific research on nutrition behavior, including psychology, is in at the onset of the 21st century. I considered the apparent shortfall of research activities in this field to be a scientific challenge and a personal chance for helping to shed some light on one of the most natural domains of human behavior that, for some reason, has more or less been neglected by the social sciences, until quite recently.

My basic interest as a market researcher has always been in what normal people normally do and not in abnormal or extreme behaviors and experiences of small subgroups of the population. Thus, I wanted to investigate the everyday nutrition behavior of ordinary people in their natural environments. And because there appears to exist even less knowledge of the conditions of beverage consumption as opposed to the conditions of solid food intake, I decided to focus my efforts on drinking rather than on eating behavior.

This resulting piece of research could not have been accomplished without the substantial aid and support by other people. At the very beginning, it was Rainer Lamp from Unilever in Hamburg, whom I was working with on several projects addressing fundamental issues of the why and how of human food choice, who triggered my interest in nutritional psychology. Subsequently there have been numerous others who fostered my understanding of the matter, who assisted me in straightening up my reasoning about it, and who helped me to gain insights. Many of them were colleagues, clients, or students; some of them were well-known experts in the field of nutrition behavior; and then there were the many ordinary food-consuming persons next door who readily shared their views on eating and drinking with me. All of these contributions are gratefully appreciated.

For his scientific advice, for his unlimited patience, and his continuous encouragement that he has given me during all phases of the development of this study, I am deeply indebted to Prof. Dr. Lothar Buse of the University of Hamburg, Department of Psychology. He has always given me his full attention whenever the subject required it.

I also owe my former employer Ulf Seifert, Managing Director of Partner Research Marktforschungs-GmbH in Hamburg, a debt of gratitude for his long-lasting acceptance of the limitations of my working times and work loads on his company's behalf due to the obligations resulting from my working on this project. He also provided relevant material support by permitting me to use some of the company's technical resources like computer hard- and software, photocopiers, and so forth.

The empirical part of this study is based on information collected from 237 students who have unveiled many details of their daily lives for the sake of psychological research. I express my special thanks to everyone of them for their cooperation and commitment. Many thanks also go to Peter Walton for giving the text a critical native speaker's look.

Last but not least, I want to thank all the people around me who have been so tolerant and patient with me when time and again, for years, I asked them to excuse me because I had to be busy with some extra work.

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CHAPTER ONE

Introduction

1.1 Global Perspective

Historical Context: Searching For and Finding Food

Since the beginning of humankind, eating and drinking have been amongst the most often repeated behavior patterns of all human beings (e.g., Pudel, 2000). Like breathing, these behaviors are directed towards the intake of selected materials from the environment to sustain an individual's physical existence: "The single purpose of human appetite is to begin the alchemy of transforming other organisms into humans" (Scott & Verhagen, 2000, cited in Stillman, 2002, p. 1498). And throughout the history of humankind, in most regions and during most ages, everyday life was stamped by the experience of nutritional insecurity, shortage of foods, hunger, and famines (e.g., Montanari, 1999; Pudel & Westenhöfer, 2003). On the other hand, the preparation and consumption of food served, and still serves, many more purposes than simple supply of nutrients; for example, it can be a source of pleasure (e.g., Pudel & Westenhöfer, 2003), a means of communication (e.g., Karmasin, 1999), or a focal point of daily and festive social activities (e.g., Andressen, 1996; Bitsch, Ehlert, & Ertzdorff, 1997; Laurioux, 1999; Maichrowitz, 1999; Paczensky & Dünnebier, 1999).

Throughout their evolution, human beings have developed biological mechanisms and behavioral strategies to cope with nutritional insecurity and to counteract the recurring phases of food shortage. From the perspective of evolutionary biology there is evidence, for example, for members of the human and many other species to possess an innate preference for sweet foods because this taste quality indicates a high concentration of sugar and, therefore, of energy, which, in turn, makes individual survival more likely (Logue, 2004). Furthermore, when plenty of food is available, the body is able to store nutrients and energy so that a well-nourished individual can survive for weeks without eating (e.g., Hauber-Schwenk & Schwenk, 2000).

During the process of socialization, individuals acquire behavioral skills that are relevant to securing their own existence and that of important others; for example, they learn to distinguish between edible and inedible plants and animals; they learn to preserve foods and to stock up on them when a surplus is available (e.g, Pudel & Westenhöfer, 2003). Children are taught to eat what is being given to them and to finish it off even when they feel already satiated. When food is scarce and the next meal is uncertain, traditions like these make sure that individuals learn to avoid starvation. Thus, human beings are biologically and culturally well equipped to master the key task of *searching for and finding* food when there is *general lack* of it (Pudel, 2002; Pudel & Westenhöfer, 2003).

In Germany, during the years following World War II, food supply had reached its last historical low requiring most individuals to perform the task of searching and finding with maximum effort to ensure their physical survival. Since then, however, along with the rapid economic growth, the environmental conditions for performing nutrition behavior have undergone dramatic changes within a period of less than a lifespan, unprecedented in magnitude and stability, pushing individuals ahead into a situation that their ancestors may have dreamed of as the land of cockaigne.

Food Choice in Affluent Societies

By the end of the 20th century, Germany had become one of the leading food exporting and also importing countries (Kutsch, 2000, p. 19). Today, its food industry is the fourth largest branch of industry (Statistisches Bundesamt, 2005, p. 373); it produces annually ca 125,000,000,000 kg of food (Carle & Schieber, 2006, p. 348) using ca 230,000 different bar codes for identification of their products at the supermarkets' cash desks (Pudel, 2002, p. 55). While a single supermarket offers several thousands of food products (Pudel, 2002, p. 55), a German single-person household uses only ca

40 and a three-person household hardly more than 80 of them on average (Pudel, 2000, p. 109). This abundance of food products is accessible in its full and still increasing diversity to virtually everybody in all parts of the country at affordable monetary and nonmonetary costs. Nearly any volume of any product can be obtained, and a nationwide network of gas stations open 24 hours a day guarantees provision of a selected range of products even when the supermarkets are closed. Fresh products can be bought regardless of seasonal fluctuations or crop failures, and prices for food products are very low compared to the average net-income of German households. It has become a matter of course that some products like sugar or salt are given away in restaurants free of charge, while a few centuries ago they were only available at a price equivalent to their weight in gold (Pudel, 2002, p. 55).

As individuals are nowadays confronted with this overwhelming variety, they are facing a new key task to ensure their physical survival: Instead of searching for and finding food they are *forced to make decisions between food products* that are easily accessible in their natural environments ("food in arm-length", Oltersdorf, 2002, p. 180). Unfortunately, individuals tend to be only badly prepared to cope with this new task because they are predisposed and educated to perform behavior patterns aimed at dealing with or avoiding food shortage (Hebebrand, 2005; Pudel & Westenhöfer, 2003, pp. 48-49). The opulence of foods on offer is accompanied by a difficult-to-manage quantity of information from, for example, mass media reports, lists of ingredients on food packages which are written in technical terms and difficult to understand for a layman, or advice from more or less qualified experts who often do not agree with each other. This information overload contributes to a state of uncertainty about nutrition-related issues many individuals feel put into (Boës, 1997; Oltersdorf, 1995a; Pudel, 1995).

While scientists confirm the very high standard of quality and safety of the currently available food products, they attribute the highest nutrition-related risks to faults in dealing with foods and poor eating habits on the consumers' side. Consumers, on the other hand, seem to perceive risks related to food quality and nutrition as coming from the chemical or microbiological contamination of food products rather than from their own nutrition-related behavior (Oltersdorf, 1995a; Pudel, 2000, 2002; Special Eurobarometer 238, 2006). In consequence, as an example, consumers' demand for foods, unprocessed and free of preservatives and thus believed to be healthier, has increased and is being met by food producers (Robert Koch-Institut [RKI], 2002a). But, because knowledge and skills in the population related to food handling and preparation are rapidly decreasing (Oltersdorf, 2002; Pudel, 2000), the increasing consumption of foods considered to be in a more natural condition leads to a higher risk of microbiological contamination due to insufficient hygienic product handling, which in turn contributes to an increase of reported food-related infections (RKI, 2002a).

Today, individuals in Germany as well as in other affluent societies have the historical opportunity to compose a diet perfectly matching their biological needs, but only a minority of them actually manages to do so (Pudel & Westenhöfer, 2003). Instead very many people feed on a diet that is not balanced in terms of adequate supply of nutrients or energy increasing their risk of coming down with, and possibly dying of, diseases which at least partly depend on malnutrition, for example, cancer or cardiovascular diseases, but also osteoporosis or dental caries (e.g., Deutsche Gesellschaft für Ernährung [DGE], 2004; Hauber-Schwenk & Schwenk, 2000; Kohlmeier, Kroke, Pötzsch, Kohlmeier & Martin, 1993; Ogden, 2003). Obesity has been found to be a risk factor for severe chronic diseases (e.g., DGE, 2004; Kohlmeier et al., 1993; Pudel & Westenhöfer, 2003; Vögele, 2005) and has reached epidemic proportions (RKI, 2005a; Seidell & Visscher, 2004; World Health Organization [WHO], 2003) even among children (e.g., Koletzko, 2005; Reinehr, 2005). Excessive alcohol consumption and eating disorders like anorexia nervosa are posing further challenges to the public health-care system (e.g., Bode & Parlesak, 2001; Pudel & Westenhöfer, 2003). Monetary costs for repairing the effects of nutrition-related diseases, which are intensified by a convenience-oriented sedentary life-style, amount to dozens of billions of euros for the German national economy (Kohlmeier et al., 1993; Pudel, 2002, p. 41).

Global Disparities

Although there is calculatively enough food produced and potable water available worldwide to nourish the whole growing world population adequately (Hauber-Schwenk & Schwenk, 2000, p. 11; Iskandarani & Webb, 2000), there exist obvious nutrition-related disparities among individuals. First, there is a difference *between* affluent and poor societies with food insecurity and undernourishment being the main problem for the latter ones (e.g., Food and Agriculture Organization of the United Nations [FAO], 2005; Manary & Solomons, 2004; Oltersdorf & Weingärtner 1996; Pandya-Lorch & Pinstrup-Andersen, 2000) forcing the majority of the world population to still pursue the search-and-find strategy in order not to starve. In spite of their efforts, ca 850 million people worldwide suffer from hunger and undernutrition and every year more than 10 million children die before they reach the age of five because they do not have enough to eat (FAO, 2005, 2008; Hauber-Schwenk & Schwenk, 2000; Kutsch, 2000).

And second, there are differences between individuals *within* existing societies, remarkably also within the affluent ones, in terms of, for example, socioeconomic status (SES) or nutrition knowledge which are related to the appropriateness of individual food choices leading to a more or less health-promoting and life-sustaining diet (e.g., Barlösius, Feichtinger, & Köhler, 1995; DGE, 2004; Hauber-Schwenk & Schwenk, 2000; Kamensky, Feichtinger, & Zenz, 2000; Köhler, Feichtinger, Barlösius, & Dowler, 1997; Langnäse, Mast, & Müller, 1999, 2000; Müller, Danielzik, Pust, & Landsberg, 2006).

This very brief overview of some general aspects related to human nutrition has been given to outline the global context within which the present piece of research was conducted.

1.2 Scientific Approaches to Understanding Nutrition Behavior

As eating and drinking belong to the most vital domains of everyday behavior, they have always attracted and are still attracting considerable attention not only from the nourishing individuals but also from the sciences and from politics. While the science of history has gathered impressive information about the ways our forefathers fed themselves (e.g., Andressen, 1996; Bitsch, Ehlert, & Ertzdorff, 1997; Laurioux, 1999; Paczensky & Dünnebier, 1999; Spiekermann, 1996), the history of science reveals significant changes in interest in the topic throughout the ages.

From the ancient world until the 19th century, dietetics played a leading role in the organization and application of nutrition knowledge. It was a holistic approach which affected many aspects of public and private life including nutrition-related issues and general matters of well-being and life-style. It provided nutritional advice for a balanced diet to prevent individuals from falling ill and also for an adequate composition of foods supporting the recovery of the sick. But it was also concerned, for example, with the just distribution of foods across individuals according to their social status (Barlösius, 1999).

Then in the 19th century, the natural sciences began to investigate nutrition-related phenomena and their view on the subject soon became the predominant approach for its description and explanation. The scientific concern was now mainly with the chemistry of nutrients and their metabolism inside a physiologically functioning "human caloric combustion engine" ("kalorische Verbrennungsmaschine Mensch", Spiekermann, 2000) rather than with a holistically balanced life-style. Dietetics, from now on, was narrowed down to the administration of special diets to help the sick convalesce. The natural scientific perspective has always been instrumentalized by politics. It has been used, for example, to calculate the amount of food needed by a worker to maintain his capacity to work and to sustain his family and, in consequence, to calculate minimum wages enabling him to buy it (Barlösius, 1999; Spiekermann, 2000).

When nutrition science emerged as a separate branch from the rest of the natural sciences in the middle of the 20th century, its main concern was no longer securing enough food for everybody, but to deal with the health hazards resulting from inappropriate choices from abundantly available foods. Due to this shift in focus away from the foods towards eating behavior and consumption habits, researchers began to share interest in behavioral aspects of nutrition (Barlösius, 1999). Nowadays, the programmatic concept of a *new* nutrition science for the 21st century is trying to re-integrate biological, societal, and ecological aspects of nutrition in a global sense (Leitzmann & Cannon, 2006).

Although the natural scientific perspective is still prevailing today, academic attempts to describe, predict, and explain nutrition-related issues including nutrition behavior are as diverse as the traditions and methodologies of the various sciences. Natural sciences, including nutrition and medical science as well as food science and technology, cultural, economic, and social sciences approach the field from different starting points and they all have their own quest for knowledge. At least three major lines of research can be identified targeting nutrition *behavior*. Common to all three is a need for understanding the determinants of food choice at the microlevel of individuals or households. Knowing at least some of them will be a prerequisite for successful interventions both at the individual level and at the population level.

The first line involves the cultural and social sciences which try to describe and to understand the role of food acquisition, its preparation, and its consumption in the broadest sense as a constitutive characteristic of human civilization (e.g., Barlösius, 1999; Bayer, Kutsch, & Ohly, 1999; Bundschu, 1995; Karmasin, 1999; Kutsch, 2000; Macbeth, 1997; Paczensky & Dünnebier, 1999). For example, researchers have identified the meal as a social institution that has been universally present in all cultures and during all ages. Within a given culture, they attempt to analyze the rules which more or less explicitly prescribe, for example, the time, the location, the participants, the duration, and the constituents of a meal, as well as any behaviors that must be and those that must not be performed in the context of its preparation, its consumption, and the disposal of its leftovers. These rules also regulate the sequence of courses, if any, within a meal, the sequence of meals within a day, the foods that are acceptable to eat on a specific day or on a given occasion and those that are not, and so forth (e.g., Barlösius, 1999; Bayer, Kutsch, & Ohly, 1999).

The social sciences also deal with the access to food and its distribution across individuals as an important dimension of social inequality (e.g., Barlösius, Feichtinger, & Köhler, 1995; Köhler, Feichtinger, Barlösius, & Dowler, 1997). For example, there are indications that the lower the SES of a person, the more likely that person will be affected by malnutrition and obesity, which may result from, among other things, lower consumption rates of vegetables and fruit and higher intake of fat, respectively; also, according to Engel's law, individuals' expenditures for food increase with increasing income but they rise at a slower pace than the income; in other words, the lower the income the bigger is its relative share that is spent on food. Furthermore, in families with a lower SES, parents tend to employ food more readily in an attempt at educating their children, for example, when punishing misbehavior by withholding dessert or when giving sweets as a reward (e.g., Bayer, Kutsch, & Ohly, 1999; Kamensky, Feichtinger, & Zenz, 2000).

A second focus of research is around the relationship between food patterns and individual and public health. The leading question here is how these patterns may contribute to maintaining health or putting it at risk, respectively, as in the case of, for example, overweight and obesity (e.g., WHO, 2003). This is probably the field which most of the activities, personnel, and publications and also the largest sum of budgets are allocated to. It attracts attention, for example, from the nutrition sciences (e.g., *Ernährungs-Umschau;* Gibney, Margetts, Kearney, & Arab, 2004; Hauber-Schwenk & Schwenk, 2000), from medicine (e.g., *Aktuelle Ernährungsmedizin; American Journal of Clinical Nutrition; Eating Behaviors; Public Health Nutrition*), from epidemiology (e.g., Nelson, Beresford, & Kearney, 2004; Oltersdorf, 1995b, 2000), from the social sciences (e.g., Diehl & Leitzmann, 1985; Feichtinger & Köhler, 1995), from psychiatry and abnormal psychology dealing with eating disorders and alcohol abuse (e.g., Logue, 2004; Ogden, 2003), and from other areas of psychology (cf. chap. 2). Study results have also been published in books (e.g., Diedrichsen, 1995a; Kutsch, 1993) or in periodicals (e.g., *Appetite; Food Quality and Preference*) that put explicit emphasis on the interdisciplinary nature of the subject. Several large-scale surveys on the topic have recently been or are currently being conducted in Germany, many of which aim at providing empirically derived basic information on food patterns and nutrient supply in the general population (e.g., Bauch et al., 2006; Benterbusch, 1999; Brombach, Wagner, Eisinger-Watzl, & Heyer, 2006; Krems et al., 2006; Kübler, Hüppe, Matiaske, Rosenbauer, & Anders, 1990; Mensink, Beitz, Burger, & Bisson, 2000; Mensink, Thamm, & Haas, 1999; Nestlé Deutschland AG, 1999; Projektträger "Forschung im Dienste der Gesundheit", 1992; Sell, Gedrich, Fischer, & Döring, 2003; Techniker Krankenkasse, 1995; Winkler, 1998).

And thirdly, production, marketing, and distribution of foodstuffs as commercial goods are important for food economics. A great deal of knowledge has been accumulated in this field, for example, regarding the structure and the development of the food industry and the food retail market over the years. It has been established, to give an illustration, that the number of shops in the German retail market has been cut down to half within the final 25 years of the 20th century while the average floorspace of a single shop has increased during the same period; as a result, consumers today need to cover longer average distances to reach their nearest shop, which, on the other hand, is likely to have a wider range of products or brands on offer (e.g., Kutsch, 2000).

A wealth of information is further being generated by commercial consumer research on food products making use of socioscientific research methods. Consumer or market research looks from the producer's point of view and focuses on the point-of-sale situation where their products are chosen for purchase by the consumers. It tries to understand the motives underlying these choices (cf., e.g., Grunert, 2006). But because this kind of research is often commissioned by food manufacturers to get a competitive advantage, its results will generally not be made available for public use (exceptions can be found in, e.g., Knoblich, Scharf, & Schubert, 1996; Marshall, 1995a; *Planung und Analyse*). A typical example of food market research is to give samples of a new product to a sample of consumers and ask them to evaluate the product. Depending on the answers, the food engineers may afterwards try to optimize the product's physical properties before it is launched in order to enhance its compatibility with the requirements of the consumers, or the marketing managers may want to reconsider the intended positioning of the product in the minds of the consumers (see, e.g., Knoblich, Scharf, & Schubert, 1996).

In the mean time, a huge and ever growing body of published research results has become available, yet these findings are still fragmentary, they lack integration and coherence, and little effort can be observed to bring them together (Barlösius, 1999; Booth, 1994; Marshall, 1995b; Ogden, 2003). In some cases different sciences even compete for similar research objectives. In the field of nutrition education, for example, which is occupied by nutrition science, researchers have developed psychological concepts about human nutrition that often do not have very much in common with concepts coming from psychology (Barlösius, 1999, pp. 20-21). Psychology, in turn, leaves those researchers from other disciplines, who show interest in nutrition behavior, on their own without giving them much specific guidance as to how to approach the field (Booth, 1994, pp. 184-186; but cf. chap. 2).

Taken altogether, it is not surprising to see that there is no comprehensive catalog of factors available that might affect food choice although attempts have been made to compile lists and overviews that are as exhaustive as possible (e.g., Bayer, Kutsch, & Ohly, 1999, pp. 98-99; Conner & Armitage, 2002, p. 6; Diedrichsen, 1995b, p. 45; Diehl, 1980, p. 5; Gedrich, 2003; Köster, 2009, p. 72; Pudel & Westenhöfer, 2003, p. 52; Rozin, 2006; Sichert, Oltersdorf, Winzen, & Leitzmann, 1984, pp. 7-11; Sobal, Bisogni, Devine, & Jastran, 2006, pp. 5-7; Wüstefeld-Würfel, 1999, pp. 25-41). Because of the interdisciplinary nature of such lists many of their entries cover identical sources of influence but name them differently according to the variety of the underlying academic concepts and terminologies. Still, empirical evidence can be found for the majority of these factors to be related at least to some degree to interindividual differences in nutrition behavior measured either in the laboratory or in natural environments (cf. chap. 2 for examples).

1.3 Beverages in Human Nutrition

Relevance of Water Intake

The main component of the human body is water; its share of weight in an adult ranges from approximately 50% to 65%, depending on age, sex, and the proportions of body fat and muscles (DGE, 2000a; Hauber-Schwenk & Schwenk, 2000; Informationszentrale Deutsches Mineralwasser [IDM], 2003, 2005a, b). In the long run, this share varies intraindividually only within a small range of ca ± 0.22% (Birbaumer & Schmidt, 2006, p. 645). Between 2 and 2.5 L of body water are lost daily to the environment through the skin, intestine, lungs, and kidneys. This loss can amount to much more than 10 L depending, for example, on physical activities like exercise or labor; on weather conditions like temperature, air humidity, or wind; on conditions of impaired physical health like fever, vomiting, or diarrhea; on dieting; or on increased ingestion of particular nutrients like salt or protein (DGE, 2000a; Henrichsmeier & Grothe, 1997; IDM, 2003, 2005a; Stahl & Heseker, 2006; Stiftung Warentest, 2001; Verbraucher-Zentrale NRW, 2000; Wagner, Schröder, & Peil, 1996).

All lost water needs to be replenished regularly through ingestion to avoid the state of dehydration as the human body is not capable of storing an extra volume of water for the purpose of future replenishment. This water balance is a very sensitive dynamic equilibrium, disturbations of which can become life-threatening very quickly. A loss of 0.5% of body water causes a sensation of thirst, greater losses result in increasing impairment of physical and mental performance; losing as much as 15% or more will cause death. Depriving individuals of water supply will not enable them to survive much more than 72 hours (Birbaumer & Schmidt, 2006; Hauber-Schwenk & Schwenk, 2000; IDM 2005a, b; Schek, 2000; Stahl & Heseker, 2006).

Sources of water supply in human nutrition are: (a) beverages, whose main constituent is also water; (b) water that is contained to varying degrees in foods that are eaten; and (c) water of oxidation, which is produced inside the body as a resulting compound from chemical reactions when non-water constituents of foods are metabolized. Compared to the latter two ways of water provision, beverages are quantitatively the most important source for the maintenance of an individual's water balance (DGE, 2000a, p. 146; Hauber-Schwenk & Schwenk, 2000, p. 49). It is suggested to replace water losses with potable water, unsugared herbal teas, or mixtures of water and fruit juice rather than with alcoholic, caffeinic, or sweetened beverages, or with milk (e.g., DGE, 2002; Hagen & Schmahl, 1996; IDM, 2003; Stahl & Heseker, 2006; "Trinken im Sommer", 1999).

Due to the various biological and behavioral differences between and within individuals and due to the changing environments they are in, no clear-cut rule for a minimum volume of daily water intake through beverages can be given. Hence, amounts recommended in the literature range from ca 1 to 2 L of beverage intake for adult individuals in Germany per day in order to meet their body requirements (e.g., DGE, 2000a; IDM, 2003, 2005b; Mensink, Beitz, Burger, & Bisson, 2000; Schek, 2000; Stahl & Heseker, 2006; Techniker Krankenkasse, 1993; "Trinken im Sommer", 1999; Wagner, Schröder, & Peil, 1996); there is no upper limit recommended within a range of up to 10 L (DGE, 2000a, p. 149; Stahl & Heseker, 2006). As regards fluid supply at the population level, some doubts have been raised as to whether actual fluid intake meets or even surpasses physiological requirements because on average, based on data of the National Nutrition Survey (cf., e.g., Projektträger "Forschung im Dienste der Gesundheit", 1992), individuals in Germany are suspected to be affected by mild to chronic dehydration due to insufficient fluid consumption (e.g., Wentz, Boeing, Remer, & Manz, 2004; see also Pfau & Piekarski, 2000; but cf., e.g., Lührmann et al. 2001; Mensink, Beitz, Burger, & Bisson, 2000). Most recent data of a replication of the National Nutrition Survey, however, do not support this finding (Hilbig et al., 2009; Max Rubner-Institut, 2008).

Categories of Potable Water in Germany

Less than 1% of all water existing worldwide is potentially usable as potable freshwater (IDM, 2003; Lenz, 2002; Verbraucher-Zentrale NRW, 2000), a fifth of which is stored in the oldest and deepest lake in the world, Lake Baikal in Siberia (Apollinaris & Schweppes, 1994, p. 93). The fabrication of potable water from natural resources is part of the primary production sector like, for example, agriculture, fishing, or mining. In Germany, potable water is commercially offered in different formats, which vary in terms of their production process, their chemical composition, and the legal standards of their identity (cf. Arzneimittelgesetz, 2002; Mineral- und Tafelwasserverordnung, 2005; Trinkwasserverordnung, 2001). Potable water comes in five different formats: (a) drinking water from the domestic tap ("Trinkwasser"), (b) mineral water ("Natürliches Mineralwasser"), (c) spring water ("Quellwasser"), (d) table water ("Tafelwasser"), and (e) water for medicinal purposes ("Heilwasser").

Drinking water from the tap is the most important food product; it cannot be substituted by anything else (Lenz, 2002, p. 11; Verbraucher-Zentrale NRW, 2000, p. 19). Its safe nationwide supply is an essential component of the infrastructure of a developed society. In Germany, it is mostly obtained from groundwater and water from lakes and rivers. During the chemical and mechanical process of its purification, which may necessitate the use of dozens of chemicals, the raw water is cleaned so that the concentrations of its pollutants, if any, are below the legal limits and that the final product is free of pathogenic germs (IDM, 2003; Schwenk, 2002; Verbraucher-Zentrale NRW, 2000). The legal limits are set in such a way as to make sure that a lifelong consumption of 2 L per day will not cause damage to health (Lenz, 2002, p. 14; Verbraucher-Zentrale NRW, 2000, p. 19).

Mineral water, which the present piece of research is aimed at, is precisely defined by German law. It is water of subterranean origin from a geologically exactly specified reservoir that is protected against pollution. All of its components including any potentially harmful substances must be geogenic, no anthropogenic pollutants may be contained (Verbraucher-Zentrale NRW, 2000, p. 55). Very few procedures of industrial processing may legally be applied to mineral water; for example, the addition or removal of carbonic acid or removal of iron or sulphur is admissible. No disinfection is allowed, as it needs to be naturally free of pathogenic germs (IDM, 2003, 2005c; Verbraucher-Zentrale NRW, 2000, p. 55). Mineral water must have at least 1 g/L minerals and trace elements dissolved in it (Hauber-Schwenk & Schwenk, 2000, p. 73) which need to have a nutritional effect in terms of a positive influence on human physiology; mineral water is free of calories. It is subjected to more than 200 scientific analyses before it is licensed to enter the market. In fact, it is the only food product in Germany that requires official permission before it may be marketed. At the place of origin, it needs to be filled in bottles, carton packages or the like that are intended for use by the final consumer (IDM, 2003, 2005c; Verbraucher-Zentrale NRW, 2000, p. 55). In gastronomy, for example, it must be served to the guest in the packaging in which it was bottled by the manufacturer, and it must not be poured into glasses before serving (IDM, 2005c, p. 17; Verbraucher-Zentrale NRW, 2000, p. 56-57); if it is, it may not be offered and sold as *mineral* water.

The production process of spring water is very similar to mineral water (e.g., geographically specified subterranean origin, addition or removal of carbonic acid, hygienic requirements, bottling at place of origin); its composition, however, only needs to meet the standards set for drinking water, not for mineral water. For example, its reservoir does not need to be protected against anthropogenic pollutants, and no nutritional effect of its dissolved ingredients is required (Apollinaris & Schweppes, 1994; IDM, 2003; Verbraucher-Zentrale NRW, 2000).

Table water, as opposed to mineral and spring water, is not a natural product; it is an industrially produced beverage. Its basis is tap or mineral water, but salt, sea water, and other legally permissible substances may be added to compose a tailor-made beverage. It does not need to have a unique origin; instead it may be produced and bottled anywhere or may be shipped in large containers to resellers, for example, in gastronomy. It must meet the standards for drinking water only and no nutritional effect of its ingredients is required (Apollinaris & Schweppes, 1994; IDM, 2003; Verbraucher-Zentrale NRW, 2000).

Water for medicinal purposes is very similar to mineral water in terms of production and composition; its minerals and trace elements, however, need to have a scientifically proven prophylactic, alleviating, or curative effect. It is considered a medicine and, therefore, is subject to pharmaceutical laws (Apollinaris & Schweppes, 1994; IDM, 2003; Verbraucher-Zentrale NRW, 2000).

Since the predominant constituent of all potable waters is the chemical compound water (H_2O), differences between them may be suspected to be of legal or commercial nature only, below the differential threshold of ordinary consumers. Yet, as Falahee and MacRae (1995, 1997) have demonstrated, even untrained individuals are potentially able to perceive such differences.

Water Consumption in Germany

When trying to grasp the quantitative relevance of mineral water for diet composition and fluid intake, there are two different viable approaches: analyzing sales volumes and trade figures at the macroeconomic level and eventually breaking them down to per-capita consumption, on the one hand, or looking at real consumption behavior at the microeconomic level of individuals or households, on the other hand, and inferring population parameters from them. In any case, comparing information from different sources even within either of these approaches is difficult due to many differences in the way it was collected, compiled, and aggregated and due to different time periods that the information refers to.

Authors giving estimates of global consumption at the macrolevel for *bottled* or *prepacked* water (i.e., all water formats excluding water from the domestic tap) agree on Western Europeans having the highest average per-capita consumption in the world (Balg, 2004, p. 9; Ferrier, 2001, p. 12). Within Western Europe, German consumers rank third in terms of per-capita consumption of *mineral* water (including water for medicinal purposes: M = 126.9 L in 2005; IDM, 2005d) behind Italian and Belgian consumers (Verband Deutscher Mineralbrunnen, n.d.).

In Germany, mineral water has by far the biggest share of all prepacked water production. Figures that are available for mineral water plus water for medicinal purposes suggest that 98% of the combined volume is mineral water (Verband Deutscher Mineralbrunnen, n.d.); the share of this combined volume of all bottled water, including spring and table water, is 95% (Wirtschaftsvereinigung Alkoholfreie Getränke, n.d.). Thus, the volume of mineral water alone is roughly 93% of the total volume of all prepacked water consumed in Germany. Its average per-capita consumption in Germany has increased ca 10-fold from M = 12.5 L in 1970 (IDM, 2005d; Verband Deutscher Mineralbrunnen, n.d.) and ca 26-fold from M = 4.8 L in 1950 (including spring and table water; Stemmer, 1996, p. 8). Mineral water contributes an estimated share of ca 15% to the total volume of beverages consumed in Germany, which is the third biggest share after coffee and beer and just ahead of soft drinks which rank fourth (Balg, 2004, p. 5; Stemmer, 1996, p. 13).

There are not many surveys available that were carried out at the microlevel of individual nutrition behavior that include or even particularly target drinking behavior, and the results of those that do exist are in some cases confined in their generalizability to, for example, specific regions (e.g., Techniker Krankenkasse, 1995) or subpopulations (e.g., Faber, 1996; Libuda, Alexy, & Kersting, 2006; Lührmann et al., 2001; Pfau & Piekarski, 2000), or they suffer from obvious biases due to, for example, unusually hot weather conditions during the data collection period (e.g., Bundesverband der Deutschen Erfrischungsgetränke-Industrie, 1998; Henrichsmeier & Grothe, 1997; Hilbig et al., 2009), or they do not allow for the quantification of volumes of intake (e.g., Axel Springer AG - Mediapilot, 2005; Sell, Gedrich, Fischer, & Döring, 2003).

In spite of this, findings from these sources generally seem to corroborate the strong quantitative relevance of both mineral water and coffee for daily fluid intake, but they are less unambiguous in determining the position of mineral water in relation to other beverages. Among the surveys that are most representative of the general population in Germany, there are the cross-sectionally designed National Nutrition Surveys (Hilbig et al., 2009; Max Rubner-Institut, 2008; Mensink, Beitz, Burger, & Bisson, 2000; RKI, 2002b) and the Verbraucheranalyse (Axel Springer AG - Mediapilot, 2005), an electronic data base that is regularly updated and open to use by the general public via the internet. In March 2008, it consisted of N = 29,621 entries of individuals who reported their daily consumption behavior for a wide variety of product categories.

According to results from the National Nutrition Survey (Mensink, Beitz, Burger, & Bisson, 2000, pp. 330-331), which the authors present separately for both sexes and six age-groups, the volume of average daily intake of (not further specified) potable water makes up the biggest single share of all ingested beverages for both sexes and nearly all age-groups (i.e., cohorts). While there are minor differences between both sexes and across the age-groups for coffee and soft drinks, both these beverages contribute substantially to total daily fluid intake in the population, but each at a lower level in volume compared to water. For beer consumption, quite unsurprisingly, there are huge differences between males and females with the former drinking between 7 and 12 times the volume on average of what females of the same age-groups drink. But even for males, the average volume of beer intake is considerably lower than that of water, and in all but one age-group it is lower than that of coffee. Latest figures from the *Second* National Nutrition Survey (Hilbig et al., 2009; see also Max Rubner-Institut, 2008) basically confirm these relationships and stress the paramount position of potable water in the set of typically ingested beverages.

The Verbraucheranalyse (Axel Springer AG - Mediapilot, 2005) supplies consumption frequencies instead of volumes. Here, 88% of the respondents claim to consume a beverage of the combined category mineral water and table water more than once a week, 77% even say they do it daily. Slightly lower percentages claim to drink coffee more often than once a week (80%) or even daily (72%). The corresponding shares for beer are 26% and 7%, respectively. Again, a strong difference between the sexes emerges: 46% of males drink beer more than once a week (13% daily), but only 8% of females (2% daily). The volume and frequency of beer intake also depends on regional factors (e.g., DGE, 2004, p. 31; Linseisen & Wolfram, 1995; Wagner-Rauh, 1995).

Survey-based information suggests that other categories of beverages also have some quantitative relevance for fluid intake, for example, soft drinks, black and herbal teas, fruit and vegetable juices, mixtures of water and fruit juice, milk, or wine (Axel Springer AG - Mediapilot, 2005; Bundesverband der Deutschen Erfrischungsgetränke-Industrie, 1998; Henrichsmeier & Grothe, 1997; Hilbig et al., 2009; Linseisen & Wolfram, 1995; Lührmann et al. 2001; Max Rubner-Institut, 2008; Mensink, Beitz, Burger, & Bisson, 2000; Pfau & Piekarski, 2000; Wagner-Rauh, 1995), but none of them appears to be nearly as dominant as water. Even among children and adolescents, mineral and tap water are the major sources of fluid intake (Richter, Vohmann, Stahl, Heseker, & Mensink, 2008).

The contribution of tap water to total fluid intake has not been considered adequately so far in this text. Tap water is delivered to households through pipes in a free-flow format at a monetary price which is only a tiny fraction of what water in prepacked format costs (Ferrier, 2001) and practically without any nonmonetary costs like efforts related to its provisioning or to the disposal of packaging, which affect all other water categories. In consequence, according to different sources (Forum Trinkwasser, n.d. a; Lenz, 2002, p. 12; Verbraucher-Zentrale NRW, 2000, p. 27), between 96% and 98% of the average daily per-capita consumption of tap water in Germany (M = ca 128 L) are estimated to be used for purposes other than food preparation or drinking: Roughly one third is used for personal care and hygiene, one quarter to one third is flushed down lavatories, and the third largest share is used for washing clothes and dishes. A small share of 2% to 4% is used for food preparation, but how much of that is finally ingested, be it as part of the cooked foods, as hot or cold homemade drinks, or as plain water, remains unclear (Stemmer, 1996). The cited sources do not disclose, however, what kind of information these estimates are based on as supply figures alone do not, of course, allow for such a detailed analysis.

Survey-based primary data on the topic, which are rarely available (e.g., Elmadfa & Hühn, 1985; Hühn, 1993; Wüstefeld-Würfel, 1999), suggest that the share of water which is consumed straight from the tap is indeed very small; yet, this does not hold for cooking food and for the preparation of hot drinks like coffee. From the perspective of consumers, boiling tap water is believed to be a process of refinement which has a positive influence on its assumed microbiological and chemical contamination and on its taste (Hühn, 1993). Consumers' attitudes towards tap water are considerably less favorable compared to those towards mineral water. Many consumers believe, for example, that tap water is fabricated from water which has already been used before or which even comes directly from the sewage plant (Wüstefeld-Würfel, 1999). According to a recent survey (Bestnoten für Trinkwasser, 2004), however, the image of tap water has improved a lot since 1995; whether this has also led to an increase in its consumption as a drink or for food preparation, is not made clear.

From the comprehensive analyses of her representative data, Wüstefeld-Würfel (1999) concludes that consumers not only have gaps in their knowledge regarding tap water but also regarding the other water formats. Consumers appear to use their laymen's beliefs to construct their own classification systems for potable waters which do not necessarily reflect the legal categories which were summarized in the preceding section. For example, effervescence, which is a legally defining characteristic of none of the potable waters, seems to be a property whose presence characterizes mineral water and whose absence makes the product a table water, particularly when it comes in plastic bottles. On the other hand, consumers are very much aware of the fact that mineral and tap water are different categories, but only as long as the water from the tap is not aerated. As soon as soda streamers are used, which add carbon dioxide to tap water to make it effervescent, the aerated tap water, from the point of view that many consumers hold, is more similar to mineral water than it was before aeration. This notion may be facilitated by corresponding communication campaigns of the soda streamer industry or by mass media reports (Verbraucher-Zentrale NRW, 2000). Altogether, consumers appear to be least knowledgeable about spring water (Wüstefeld-Würfel, 1999).

Using an advertizing slogan like "The queen of table waters" for a mineral water product, as has been done by Apollinaris, one of the leading mineral water brands, does not help to reduce consumers' confusion. The obvious lack of appropriate information also affects professional handling of water products; in German gastronomy, for example, it is not that unusual for mineral water to be offered on the list of beverages and then, eventually, either be served illegally in glasses (i.e., not in the container it was bottled in by the manufacturer) or turn out to be a different water format when served.

There are more indications for discrepancies between food taxonomies used by food science, legislation, or marketing on the one hand and consumers on the other. For example, in a large-scale survey on the likability of 196 beverages which they carried out among West-Germans, Diehl and his colleagues (Diehl, Elmadfa, & Walter, 1985) were able to establish substantial divergencies between the 32 a priori categories for these beverages derived from food-scientific reasoning and the 21 dimensions of respondents' likability ratings obtained from factor analyses. While water for medicinal purposes and *uncarbonated* mineral water joined vegetable juice, kefir, drinkable yoghurt and other items to constitute a dimension which the authors named "'healthy' beverages" ("'gesunde' Getränke", Diehl, Elmadfa, & Walter, 1985, p. 36), neither *carbonated* mineral water nor tap water could be assigned to any of these dimensions.

The lack of correspondence between the legal definitions of water formats on the one hand, which serve as a basis for the water manufacturing industry, and the notions consumers have of water categories on the other hand is an issue that needs to be considered when researching into determinants of mineral water intake.

The results from previous research into beverage consumption in Germany make clear that the ingestion of potable water is an important source of fluid supply for humans, and mineral water seems to make up the biggest share of all potable water intake. Other quantitatively important beverages are coffee, beer, and presumably soft drinks, but all of these are not recommended for replacing lost body water, in contrast to potable water (see above). Therefore, these findings emphasize the relevance of mineral water for the composition of a nutritionally adequate diet in Germany. As individuals differ in the volume of mineral water they ingest, an investigation into the causes of these differences may contribute to developing strategies to boost its consumption.

Yet, although mineral water has the best image of all water formats (Wüstefeld-Würfel, 1999) and although it needs to prove, before it is licensed to be marketed, that its minerals and trace elements have a positive nutritional effect, its relevance for a health-promoting diet has been questioned. As Daschner (1996) explicates, samples of mineral water and of water for medicinal purposes have repeatedly been found to be microbiologically contaminated to a potentially health-threatening extent. In addition, it is believed that individuals who eat a normal mixed diet ingest enough minerals so that they will never suffer from a deficiency of minerals even if they drank tap instead of mineral water (Daschner, 1996; Stiftung Warentest, 2001). In consequence, according to this line of argument, there is no health-related reason to prefer mineral to tap water, a view which is shared, quite naturally, by the tap-water association (Forum Trinkwasser, n.d. b), except when mineral water is explicitly used to replenish lost minerals, for example, after physical exercise (e.g., Hagen & Schmahl, 1996; Stiftung Warentest, 2001; Verbraucher-Zentrale NRW, 2000).

CHAPTER TWO

Contributions of Psychology to Understanding Nutrition Behavior

2.1 Some General Principles Which Control Nutrition Behavior

A lot of information related to human nutrition *behavior*, though apparently not very much integrated, has been accumulated by psychologists and researchers from other social sciences since 1975, the year when nutritional psychology was established in Germany (Pudel & Westenhöfer, 2003). The central questions that were raised that year and which wait to be answered until today are: (a) Why do people start to eat, (b) why do they stop eating, and (c) why do they eat what they eat? Eating, in this context, encompasses normal drinking behavior (i.e., intake of beverages including alcoholic drinks but not to a clinically relevant extent), a domain where even less knowledge is available compared to that of the intake of solid foods (Pudel & Westenhöfer, 2003, p. 20). The main research objectives of nutritional psychology have been in the field of primary prevention of nutrition-related diseases with a specific focus on eating disorders, alcohol abuse, and obesity (Diedrichsen, 1995b; Diehl, 1993). According to some authors (e.g., Diedrichsen 1995b; Hayn, 2008), however, its main objective should be to explore and understand *normal* eating and drinking behavior in order to make preventive interventions more effective.

Since the 1970s several introductory textbooks as well as comprehensive overviews of the topic have been published (e.g., Axelson & Brinberg, 1989; Barker, 1983; Booth, 1994; Capaldi, 1996a; Conner & Armitage, 2002; Diedrichsen, 1990; Diehl, 1980; Diehl & Leitzmann, 1985; Feichtinger & Köhler, 1995; Gniech, 2002; Grunert, 1993; Karmasin, 1999; Klotter, 2007; Logue, 2004; Macbeth, 1997; McBride & MacFie, 1990; Marshall, 1995a; Ogden, 2003; Pudel & Westenhöfer, 2003; Shepherd

& Raats, 2006; Smith, 2002; Spitzer & Rodin, 1981; Worobey, Tepper, & Kanarek, 2006), and meanwhile, a number of theses and dissertations have become obtainable that demonstrate the interest of advanced and postgraduate students in behavioral and experiential aspects of nutrition (e.g., Börmann, 1986; Faber, 1996; Gölz, 1997; Grobe, 1999; Henrichsmeier & Grothe, 1997; Hoyer, 2003; Hühn, 1993; Lind, 1997; Meyer, 2002; Naumann & Rau, 1996; Satow, 1996; Schwerdtner, 2003; van der Valk, 1999; van Trijp, 1995; Weyrauch, 1996; Winkler, 1992; Wüstefeld-Würfel, 1999; Yaman, 2003).

Similar to the diversity of concepts and methodologies with which the various academic disciplines research into human nutrition behavior, the search for knowledge in the domain of nutritional psychology reflects the pluralism of perspectives, concepts, and targets that exist within the scope of psychology and adjacent social sciences. For example, Ogden (2003), Klotter (2007), or Pudel and Westenhöfer (2003; see also Westenhöfer, 1996) put strong emphasis on clinical aspects of nutrition behavior and also on behavior modification, while other authors (e.g., Axelson & Brinberg, 1989; Conner & Armitage, 2002) focus explicitly on sociopsychological issues; Gniech (2002; Gniech & Schepers, 1987) features a self-regulation theory that is based on a concept of the wisdom of the body; Logue (2004), in contrast, adheres strictly to a natural scientific perspective.

The majority of researchers like, for example, Capaldi (1996a) and her coauthors appear to be interested in psychological and other determinants of interindividual differences in nutrition behavior, but Schmidt-Rathjens (2000) illuminates the other side of the coin by examining the influence of interindividual differences in nutrient supply on psychological outcomes like, for instance, mental abilities or antisocial behavior (see also, e.g., Amelang & Bartussek, 2001; Diehl, 1993; Gibson, 2006; Logue, 2004; Worobey, Tepper, & Kanarek, 2006). Mehrabian (1987) explores personality correlates of abnormal eating behavior.

Knoblich, Scharf, and Schubert (1996) tackle the issue from the perspective of the food industry focusing on sensory aspects in food development; McBride and MacFie (1990) widen this view by discussing the psychological fundamentals of sensory perception; and Marshall (1995a) tries to highlight all factors preceding, accompanying, and following food choice at the point of sale in an interdisciplinary manner. Barker (1983) develops a broad, also transdisciplinary, though mainly psychobiological perspective on the topic; so does Macbeth (1997), but from a distinctly anthropological point of view.

Finally, Karmasin (1999) also looks from a market-psychological position on nutrition behavior, but she emphasizes the function of food as a means of communication with other persons similar to a system of symbols in a semiotic sense, and thus she takes up a strong sociopsychological perspective as well. Yet, across these and other sources, there is little, if any, debate about a number of basic principles that govern the acquisition and execution of nutrition behavior.

Psychobiological Determinants

Innate Mechanisms

One of them is an apparent genetic or at least innate basis for early nutrition behavior and its determinants. This is not surprising for a behavioral domain which is that essential for the physical sustainment of an individual. In order to survive, a newborn infant will not only have to be able, for example, to breathe immediately after its birth, but within hours and without a training period it must also manage to suckle from a nipple and swallow milk in a way that makes it go down the throat instead of down the windpipe (Booth, 1994, p. 20).

Based mainly on concepts from evolutionary biology, Logue (2004) reasons "that there are two distinct inborn taste response systems: an acceptance system and a rejection system" (p. 83), which are universally present in humans. The acceptance system makes individuals prefer sweet-tasting foods to others with only little interindividual variation. This predisposition gives humans and also individuals of some other species, including nonmammals, who need to pursue the strategy of searching for and finding food a cue to a safe and effective source of carbohydrates, which in the case of ripe fruit for human consumption also entails the supply of other nutrients like vitamins and minerals. The rejection system makes individuals turn down bitter-tasting foods, which reduces their risk of ingesting poisonous food items as many of these have a bitter taste (Drewnowski, 1997; Lehnert, 2006; Logue, 2004; Rozin, 1996). Because of apparent genetic variation between individuals in the perception of bitter taste, some authors (Birch, 1999; Duffy & Bartoshuk, 1996; Logue, 2004) conclude that humans live in different taste worlds, which may make them more or less likely to choose a given food and thus may lead ultimately to differences in nutrient supply.

Individuals from many species including humans from the age of ca 4 months on, but not newborn infants, exhibit a strong preference for salty tastes. As salt is an essential component in human physiology, this preference is presumed to be innate or genetically predisposed too (Logue, 2004). Also, all young mammals while being nursed, including human infants, are able to digest milk; that is, they can produce enough of the enzyme lactase to metabolize lactose, a type of sugar contained in milk. All members of all species lose this physiological ability after weaning and so does the majority of humans worldwide after they have reached the age of ca 1.5 to 3 years. However, not all humans lose it. The share of individuals being able to digest lactose as adults varies substantially between different ethnic groups; for example, ca 85% of Caucasian Americans are able to digest milk as adults but only ca 5% of Asian Americans (Logue, 2004, p. 80). Globally, there are also strong differences in these shares and in the tradition of milking animals between humans living in geographically different areas (Simoons, 1983). These differences in the ability to metabolize lactose as an adult are assumed to be genetically determined (Logue, 2004; Rozin, 1996, 2006). Thus, there are indications for the genes to impact not only nutrition behavior and taste preferences in infants but also to exert some influence on eating habits of adult humans.

Other principles that obviously affect nutrition behavior are the primary drives hunger and thirst and also the perception of food flavors, which are much more complex sensations than the taste primaries sweet or bitter. The roots of the physiological processes and anatomic structures underlying these determinants need to be imagined to be innate or genetically predisposed too.

Hunger and Thirst

Hunger is a "compelling need for food intake" (Leitzmann & Dauer, 1996, p. 170); a signal whose perception causes an individual to start eating, or an uncomfortable desire to eat something, mostly without having any specific food in mind (Pudel & Westenhöfer, 2003, p. 85); or a homeostatic drive aimed at restoring a physiological dynamic equilibrium to its set point once a deviation from this point has been established (Birbaumer & Schmidt, 2006, p. 640). Appetite, in contrast, means a pleasurable motivation to eat, which can arise even in the absence of hunger and which is often directed towards a specific food item (Leitzmann & Dauer, 1996, p. 27; Pudel & Westenhöfer, 2003, p. 85).

The process of satiation during a meal, which some authors call *intra*-meal satiety, not only causes individuals to cease from eating, but, as a result, it also makes them refrain from eating until the next meal is initiated, a state which is called satiety or, more precisely, *inter*-meal satiety (Pudel & Westenhöfer, 2003, pp. 85-86). The regulation of appetite and satiety can be imagined as a cascade-like process of pre-prandial, ingestive, and post-ingestive events involving perceptions, cognitions, behavior, and nutritive consequences related to food intake (Blundell, 1999). It is biologically based on a complex interactive network of peripheral physiological, metabolic, and central nervous activities of the body (e.g., Beglinger, 2002; Blundell, 1999; Bosello & Di Francesco, 2007; Brunn, 2006; Katschinski, 2002; Langhans, 2002; Levine & Billington, 1997; Logue, 2004; Pudel & Westenhöfer, 2003; Schusdziarra & Erdmann, 2006), which not only control food intake in the short term but also keep the adipose tissue very precisely at a constant size in the long term (Birbaumer & Schmidt, 2006, p. 648). Research on satiation has also demonstrated that the intake of water along with a meal does not effectively increase satiety or decrease the amount of food intake, respectively, as it does not bring nutrients into the gastrointestinal tract (Logue, 2004).

Similar to hunger, thirst is a "subjective, uncomfortable feeling expressing a compelling physiol[ogical] need for liquid intake; initiated by a water-balance deficit" (Leitzmann & Dauer, 1996, p. 336); and like hunger it is a homeostatic drive aimed at reestablishing the physiological equilibrium (Birbaumer & Schmidt, 2006, p. 640), a "specific central drive state which induces a readiness to search for and consume potable liquid" ("spezifischer zentraler Triebzustand, der die Bereitschaft erzeugt, trinkbare Flüssigkeit zu suchen und zu konsumieren", Birbaumer & Schmidt, 2006, p. 645) in order to maintain water balance, whose short-term regulation is even more crucial to an individual's survival than is the satiation of hunger (cf. chap. 1.3).

Two major categories of drinking behavior can be identified: homeostatic and nonhomeostatic drinking (Logue, 2004), also called primary and secondary drinking, respectively ("primäres und sekundäres Trinken", Birbaumer & Schmidt, 2006, p. 647). Homeostatic drinking is aimed at restoring the set point of a body's water balance when there is a deviation from it. This can be caused by hypovolemic thirst which occurs after body water has been lost to the environment through, for example, sweating, vomiting, or blood loss, or it can be caused by osmotic thirst which arises when the concentration of solutes in the extracellular fluid has been increased through, for example, ingestion of very salty food (Birbaumer & Schmidt, 2006; Logue, 2004). Both types of thirst are regulated by different physiological control mechanisms (Birbaumer & Schmidt, 2006, pp. 645-646; Logue, 2004, pp. 40-42). Beverage intake while eating food is assumed to be another kind of homeostatic drinking because there are indications for animals, including humans, to have a need for keeping a specific ratio of the weights of food to water in their gastrointestinal tracts. These ratios ensure species-specific optimal conditions for the absorption of nutrients (Logue, 2004; see also Engell, 1988).

After a deviation from the set point of a body's water balance has been established and thirst is felt, it will take some time from beverage intake until the set point is restored physiologically and, in consequence of that, thirst is quenched in a resorptive way. Yet, when individuals are thirsty and start drinking, their thirst appears to be quenched very much earlier than this, usually already while they are drinking. There is evidence that prior to resorptive satiation of thirst there is a preresorptive feedback control system that enables individuals to anticipate their current physiological need very precisely and thus prevents them from excessive beverage intake (Birbaumer & Schmidt, 2006, p. 647).

However, humans and many animals tend to drink, and eat, before there is an apparent need to do so. Their usual way of water supply is through secondary, non-homeostatic drinking which is not aimed at replenishing body water which has already been lost (Birbaumer & Schmidt, 2006; Logue, 2004). It encompasses all kinds of beverage intake which are not homeostatic. For example, when a meal is eaten or very salty food is ingested, the body requires additional water to be supplied for digestion, as was pointed out above. But, because this requirement does not become effective until hours after intake, consumption of a beverage along with the meal is not necessarily a response to a state of thirst that might concurrently exist, rather it is most likely aimed at counteracting an anticipated future deviation from the physiological set point (Logue, 2004). Also, when individuals deliberately ingest a lot of water, for example, before they travel through a desert or before they start exercising, their behavior is intended to counteract an expected need state (Logue, 2004, pp. 35-36).

The state of thirst should be considered as a stimulus which, like pain, indicates a physiological case of emergency. Because of this, homeostatic drinking should be avoided, and nonhomeostatic drinking should be preferred (e.g., Birbaumer & Schmidt, 2006, p. 647; DGE, 2000a, p. 147).

The "Taste" of a Food Product

Humans do not eat nutrients nor do they drink fluids; they eat food items, or dishes, which often consist of multiple components, or multi-course meals, and they drink beverages. All foods including beverages have a particular composition and a distinct sensory profile, which individuals perceive differently and assess as more or less appealing. It is a commonplace and an ever-recurring finding from consumer surveys that food products, from the consumers' point of view, need to have a "good taste" in order to be selected and consumed. And there is also ample scientific evidence that palatable foods and beverages are preferred to and consumed in larger quantities than those tasting worse (e.g., Beridot-Therond, Arts, Fantino, & Gueronniere, 1998; Birbaumer & Schmidt, 2006, p. 647; Brouns, 1996; Drewnowski, 1997; Engell & Hirsch, 1991; Knoblich, Scharf, & Schubert, 1996; Logue, 2004; Pudel & Westenhöfer, 2003), even by infants (e.g., Mennella & Beauchamp, 1996). Important dimensions of palatability are taste primaries like sweet or bitter but also many other characteristics of food products like, for example, their fat contents (e.g., Drewnowski, 1997; Duffy & Bartoshuk, 1996; Logue, 2004).

The taste of a food product is a very complex perception which is not only based on sensory input coming from the gustatory receptors on the tongue, the palate, the uvula, and in the throat, but it involves all sensory modalities that are present in the oral and nasal cavities. Specifically, this includes both orthonasal olfaction during inhalation and, more importantly, retronasal olfaction, a sensation which is caused by volatiles ascending towards the olfactory receptors in the nasal cavity from the mouth while chewing or swallowing food; it also comprises sensations of touch, temperature, and pain. Haptic input supplies information, for example, on the texture of a food item; the temperature can have a significant influence on the hedonic acceptability of beverages, on their perceived ability to quench thirst, and on the volume of intake; and sensations of pain are evoked, for example, when a meal is seasoned with chili peppers, which contain capsaicin, to make it taste hot. All this input from different senses is integrated during neural processing and eventually combines into one single sensory gestalt of what the layman calls the taste of a food item, but which should be addressed more precisely as its flavor (e.g., Burdach, 1988; Duffy & Bartoshuk, 1996; Engell & Hirsch, 1991; Gniech, 2002; Hatt, 1997; Kroeze, 1990; Logue, 2004; Mennella & Beauchamp, 1996).

Visual perception is another sensory modality which may contribute to the formation of a flavor (e.g., Gniech, 2002; Zellner & Durlach, 2002). Quite similar to orthonasal olfaction, it supplies information about the food before it is initially brought into the mouth and thus backs up the smell in its function as "an earlier line of defense" (Logue, 2004, p. 47) as opposed to the taste. It has been shown, for example, that the sweetness of a beverage can be partly replaced by color (Kroeze, 1990, p. 41); that the addition of colorants to wine can increase its perceived sweetness (Stillman, 2002, p. 1497) while to a cake it can intensify its perceived flavor (McBride & Anderson, 1990, p. 105); or that enhancing the color of flavored yoghurts can alter hedonic ratings for them (Stillman, 2002, p. 1498).

The relationship between the sensory properties of a food item and its hedonic evaluation, however, is neither straightforward nor easy to determine (cf., e.g., Booth, 1994; Raats, Daillant-Spinnler, Deliza, & MacFie, 1995; Knoblich, Scharf, & Schubert, 1996; Martens & Næs, 1989; Scharf & Fricke, 1998); and research into this field is often conducted or commissioned by the food industry so that many of the existing results remain undisclosed. Still some papers were published on the matter. As regards the thirst-quenching and refreshing characteristics of beverages, which can be important aspects of their evaluation, McEwan and Colwill (1996), for example, found that from a sample of beverages, a carbonated lemon drink, which was described by sensory assessors as acidic and astringent, was considered as most thirst-quenching by semi-naïve consumers, while strawberry milk, described as thick and sweet by the sensory experts, was considered as least thirst-quenching by the consumers. Carbonation, according to these authors, did not emerge clearly as a factor contributing to the thirst-quenching character of beverages.

On the other hand, Guinard, Souchard, Picot, Rogeaux, and Sieffermann (1998) were able to establish carbonation and bubble density as the only positive determinants of the thirst-quenching and the refreshing characteristics of beer, which were highly correlated. Using an open-ended response format, Zellner and Durlach (2002) investigated the sensory properties of foods and beverages that make them refreshing. Water was mentioned as a refreshing food by nearly all of their respondents followed by ice cream. When being asked directly for the sensory characteristics that make a food or a beverage refreshing, nearly all respondents reported properties related to the low temperature of an item (see also Rolls, Fedoroff, Guthrie, & Laster, 1990). Still Zellner and Durlach (2002, p. 186) conclude that individuals do not organize their thinking about refreshing or thirst-quenching foods in terms of the sensory properties these items have, but that they think of the foods as a whole, and when being asked for them, they construct any relevant sensory characteristics related to them.

A foodstuff's perceived flavor is also dependent on many factors other than merely its sensory profile, for example, on an individual's expectations, on the product's price, or on the social environment of its consumption (e.g., Petit & Sieffermann, 2007). The image of a product, which is essentially created by marketing activities, can have a significant influence on flavor perception too; this is evidenced in consumer tests which experimentally compare assessments of a branded product with its unbranded version (see also Deliza & MacFie, 1996; Pudel, 2002).

The flavor of a food item can also be related to emotions from earlier occasions of its consumption and may be deliberately used to elicit these emotions, for example, when a person bakes the cookies his or her grandmother used to make at Christmas time or when, during vacation in an exotic region, food that is usually eaten at home is eaten to make oneself feel more comfortable (Pudel, 1995, 2000; 2002, pp. 51-52). When being home again from that journey, an exotic meal or beverage which had been tasted and liked on that vacation may be reproduced and consumed to put oneself back in an emotional state associated with that holiday. But although the new food may have been cooked or composed exactly like that which had been tried during vacation, it may nonetheless render its perceived flavor slightly different, perhaps a bit insipid, because other taste-determining factors of the original setting of consumption that were not related to the food's sensory profile are missing now.

Sensory-Specific Satiety vs. Food Neophobia: The Omnivore's Dilemma

Humans, like rats and other animals, are able to feed upon a variety of foods, which allows them to react flexibly in cases of shortage of any specific food. They need to eat different foods, on the other hand, to ensure that they ingest all nutrients that they require in adequate quantities. This omnivorous nature of humans, therefore, offers a behavioral option for counteracting fluctuations in food supply, but it also imposes the intake of a versatile mixed diet on them. When individuals compose their diet from what is currently available around them, they will occasionally encounter novel, potentially edible matters, for example, plants, fruits, animals, or manufactured food products that they had not tried or even seen before, or a substance that may look to a salt-depleted individual like crystallized salt (e.g., Birch & Fisher, 1996; Logue, 2004; Ogden, 2003; Rolls, 1997; Rozin, 1996). In a situation like that, one basic strategy for ensuring individual survival could be to maximize food safety by relying on a small range of foods that have proven to be innocuous, but doing so would entail the risk of malnutrition; another strategy could be to ingest all necessary nutrients as adequately as possible by feeding on many different foods including novel items, but trying one of these would bear the deadly risk of eating something that turns out to be poisonous.

There seem to exist two tendencies that guide human nutrition behavior in finding a balance between both strategies: sensory-specific satiety and food neophobia. Both exert their influence in opposite directions; this is why their simultaneous impact has been called the "omnivore's dilemma" (Rozin, 1977, cited in Birch & Fisher, 1996, p. 131). When a particular food is being ingested, the rate at which it is consumed slows down and its perceived palatability decreases, and so does a person's motivation to obtain more of it; this reduction in hedonic valence is called sensory-specific satiety. It is a satiety which is selective for the food eaten and which leaves foods with different sensory properties relatively unaffected. However, it influences all foods eaten, even an individual's favorite dish. The effect lasts in the post-meal period for circa one hour, but it may also decrease the likelihood of the same food being chosen again over a longer period (Havermans, Janssen, Giesen, Roefs, & Jansen, 2009; Hetherington & Rolls, 1996; Hetherington, Rolls, & Burley, 1989; Pudel & Westenhöfer, 2003; Rolls, 1997).

As a result, an increase in the variety of available foods with different flavors, which is put into effect in multiple-component dishes or multi-course meals, will facilitate the supply of a wider range of nutrients because individuals are driven to sample from more than just one component. Yet, it will also increase the total volume of food ingested and can thus contribute to overweight and obesity in conditions where food products rich in calories are abundantly available (Logue, 2004; Pudel & Westenhöfer, 2003; Rolls, Rolls, & Rowe, 1983; Rolls, 1997; see also Berry, Beatty, & Klesges, 1985; Nicklaus, 2009). Likewise, offering a selection of different beverages is likely to increase the volume of total fluid intake (e.g., Birbaumer & Schmidt, 2006, p. 647; see also Bundesverband der Deutschen Erfrischungsgetränke-Industrie, 1998; Henrichsmeier & Grothe, 1997).

Food neophobia is a suspicion of new foods which prevents individuals from trying everything that is potentially edible without due care. Humans tend to prefer foods that they are familiar with and to reject those they have not yet experienced, a tendency which is unique neither to the food domain nor to humans; humans as well as animals generally fear new things and situations. But there are interindividual differences in the degree to which individuals are food neophobic. Individuals scoring high on food neophobia not only avoid trying novel foods, but they also tend to expect them to taste less pleasant, and if they actually try them, they will give lower hedonic ratings for them as opposed to less-neophobic persons (e.g., Arvola, Lähteenmäki, & Tuorila, 1999; Raudenbush & Frank, 1999). Repeated exposure to the flavor of a novel food item, however, will finally result in a significant increase in preference as long as the ingestion has not been followed by negative gastrointestinal consequences (Birch & Fisher, 1996; Cox & Anderson, 2004; Logue, 2004; Ogden, 2003; Pliner & Salvy, 2006; see also chap. 2.2).

In addition to the olfactory and gustatory lines of defense described above (or "built-in taste biases", Rozin, 1996, p. 237) that help to protect an individual against ingesting something poisonous, sensory-specific satiety and food neophobia are overarching principles that impact an omnivore's nutrition behavior. Globally, there exist ca 50,000 edible plants but only a few hundred of them are relevant to human nutrition. Fifteen of these supply ca 90% of the energy intake of all humans worldwide, while the top three of them (rice, corn, and wheat) together account for more than half of it (Hauber-Schwenk & Schwenk, 2000, p. 11). It may be hypothesized that both behavioral tendencies have had a substantial impact on shaping this relevant set of vegetable foods over the millennia of human evolution.

Learning and Socialization

Shortcomings of the Psychobiological Model

The psychobiological perspective was the prevailing paradigm for the early attempts of psychologists to understand food intake; they regarded ingestion as a function of hunger and satiety with homeostasis being the driving force behind it (Capaldi, 1996b). This approach is historically in line with the academic tradition of investigating primarily into natural scientific rather than socioscientific aspects of nutrition as has been outlined in the previous chapter (cf. chap. 1). But soon it became obvious that this model had some important limitations. It was acknowledged that activities leading to, accompanying, and following food intake are of an essentially social nature involving other persons in a variety of ways (e.g., Ogden, 2003, pp. 48-50; Rozin, 1996, 2006). For example, even if they are very hungry, individuals are able to postpone food intake and to wait until the scene is set for a common meal with all members of their household, or they may skip a whole meal hoping to reduce their body weight and thereby increase their physical attractiveness for other persons.

Individuals are also able to eat or drink in anticipation of a future need state (see above). It was further recognized that food patterns and preferences and even physiological responses of the body are subject to learning and thus modifiable. One of the earliest demonstrations of classical conditioning, cited time and again in introductory psychology courses and well-known even to the educated layman, the salivary reflex of Pavlov's dogs had been proven to be evocable by a conditioned (i.e., learned) stimulus early in the 1900s, but the basic relevance of this discovery to the formation of nutrition behavior was not appreciated until decades after Pavlov conducted his experiments (Capaldi, 1996b, pp. 3-5; see also Becker-Carus, 1983, pp. 48-50).

The importance of the palatability of a food product as a determinant of its purchase and subsequent consumption in saturated markets is also likely to be overestimated both by consumers and by food manufacturers (e.g., Marshall, 1995b; Raats, Daillant-Spinnler, Deliza, & MacFie, 1995; but cf. Aikman, Min, & Graham, 2006;

Cantin & Dubé, 1999; Drewnowski & Hann, 1999). There are indications from market research into the acceptance of food products that those products which compete successfully on the market for the same usage occasion or for satisfying the same need state in consumers tend to differ from each other only to a minor degree in terms of their overall hedonic appeal. Apart from interindividual differences in the preference for, for example, specific flavor variants, general palatability of a food product appears to be a prerequisite for its market success, not a distinguishing property (van Trijp, 1995, p. 1; see also Marshall, 1995a). Some authors (e.g., Bell & Meiselman, 1995, pp. 298-299; Köster, 2003) suspect that hedonic ratings are not of much predictive value for food choice at the individual level; also, these ratings do not seem to be of much importance to simulated test market modeling either, which try to forecast a new product's market success in terms of sales volumes (cf., e.g., Erichson, 1999).

Furthermore, a seemingly clear-cut pathway from the genes to behavior as in the case of lactose malabsorption becomes blurred when an individual who is unable to produce lactase without knowing it still drinks small amounts of milk while putting up with any ensuing symptoms like minor flatulence as something inevitable. And, of course, the covariance between the genes and overt behavior is further attenuated by those persons who are able to digest milk but who do not drink any milk for any reason other than its digestibility.

Thus, contrary to the often encountered layman's view, biological determinants such as genetic predispositions, hunger, homeostatic thirst, or the flavor of a food product are not necessarily the main drivers of food consumption, neither for starting or ending a meal nor for choosing from a range of available foods (e.g., Birch, 1999). Instead, the impact of these prewired determinants on manifest nutrition behavior appears to be substantially overridden by other factors (e.g., Conner & Armitage, 2002). However, based on their review of papers that were published in the field of genetic epidemiology of so-called food intake phenotypes (i.e., energy and macronutrient intake, nutrition-specific traits, eating disorders), Rankinen and Bouchard (2006) conclude that "observations from twin and family studies clearly support the notion that genetic factors contribute to human variation in food intake and eating behavior phenotypes in humans" (p. 429).

But perhaps the most important influence that biological factors have is their provision of a strong ability to acquire food-related behaviors and preferences through learning and, in consequence, to develop culinary principles and traditions, which are handed down between generations (e.g., Rozin, 1996). Pudel and Westenhöfer (2003) call the acquisition of preferences for particular foods, of the knowledge of their preparation, of the social conditions of their consumption, of the food patterns, and of related issues during the process of an individual's socialization the acquirement of that person's "cultural taste" ("der kulturelle Geschmack", p. 38). This process, according to their view, is similar to the acquisition of the mother tongue: The ability to pick up any language as a native language is innate, but which specific language is learned depends on the social environment an individual is enculturated to (Pudel & Westenhöfer, 2003, p. 38). Rozin (1996, 2006) reckons that no other single question will be nearly as informative as asking an individual "What is your culture or ethnic group?" (1996, p. 235) to become knowledgeable as much as possible about that person's food preferences and habits. For example, practically all humans like sweet tasting foods, but which foods are expected to be sweet differs between cultures. In Germany and many other European countries, chocolate and winegums are usually sweet while in the traditional cuisine of Mexico chocolate is not sweetened (Logue, 2004, p. 72) and winegums of Latin-American origin can be seasoned extremely hot with chilies (see also Pudel & Westenhöfer, 2003).

Across the whole life-span and during all phases of socialization a multitude of factors exert their influence on the formation and modification of habitual nutrition behavior and, in consequence, on behavior performance in a given situation. Some of these factors are deliberately aimed at influencing nutrition behavior, for example, educational efforts of parents to foster healthy eating patterns in their children, but, presumably, the majority of these factors affect nutrition behavior only unintentionally. And the efficacy of those factors which do intend to alter nutrition behavior in a specific direction, from nutrition education to advertising campaigns of the food industry, may be doubted (e.g., Pudel, 2002; Pudel & Westenhöfer, 2003).

A number of basic principles have been identified that direct the process of learning of modules of nutrition behavior, specifically of food preferences, though there is neither an agreement on a distinct classification scheme for them nor is there certainty about the relative strengths of their impact on the determination of nutrition behavior. There are indications that some of these principles may begin to take effect even very early in ontogenesis as the acquisition of flavor preferences is assumed to start already during the pre- and postnatal periods under the influence of the sensory profiles of the amniotic fluid and the milk, respectively, which vary inter- and intraindividually due to variations in the mothers' diets (Birch, 1999; Hudson & Distel, 1999; Mennella & Beauchamp, 1996). Therefore, Mennella and Beauchamp (1996, pp. 104-105) speculate that breast-fed infants may live in a much richer sensory world than bottle-fed infants, who experience a monotonous set of flavors from industrially standardized formulas that they fear may deprive infants of an important source of information about their family and culture.

Pathways to the shaping of food preferences have been found to be, for example, (a) the mere exposure effect, (b) flavor-flavor and flavor-nutrient learning, (c) rewarding food choice and using food as a reward, (d) taste aversion learning and its counterpart the medicine effect, (e) modeling, or (f) cognitive learning (e.g., Capaldi, 1996a; Conner & Armitage, 2002; Diedrichsen, 1995b; Diehl, 1993; Logue, 2004; Ogden, 2003; Pudel, 1995, 2000, 2002; Pudel & Westenhöfer, 2003; Yeomans, 2006). These principles will be discussed briefly in the next sections. It should be kept in mind that many of the empirical findings related to them have been derived from laboratory experiments and that they may not be envisaged as sources of influence that take effect independently of each other in real-life settings, but rather they will most certainly operate in an interactive way while shaping individual food preferences and patterns (Mela, 1999).

The *mere exposure effect* not only occurs in the food domain, it also describes the observation that, in general, the repeated exposure to a stimulus enhances its likability for a person or the attitude of that person towards it (Colman, 2003, p. 441). The exposure to food items, specifically to their flavors, which requires the items to be tasted and not only to be seen (e.g., Logue, 2004, p. 90), is a "necessary, if not sufficient, cause for food preferences" (Rozin, 1996, p. 243). But also exposure to different concentrations of a taste quality may alter preferences through sensory experience, as has been demonstrated for salty taste: Individuals eating a low-salt diet for several months finally showed a preference for lower intensities of salt in their foods. Other persons on a diet with an extra 10 g of salt per day started to prefer foods with an increased level of salt; a third group of individuals, however, who obtained this same additional quantity of salt in the form of a daily salt tablet did not show an increase in preference rendering the changes in preference dependent on tasting the salt rather than on post-ingestive consequences of its intake (Capaldi, 1996c, p. 76). The achievement of a permanent preference for a low-salt diet does not require the access to salt to be restricted: Reducing the size of the holes of the saltshakers in a cafeteria or moving them to a place where they are less comfortably accessible can have the same effect (Diehl, 1993, p. 78; cf. Meiselman, 2006, pp. 183-185).

During socialization, an individual is permanently exposed to the subset of all possible foods that are accepted and available within his or her cultural environment (Rozin, 1996, 2006) and thus is taught "the 'flavor profile' of a society" ("das 'Geschmacksprofil' einer Gesellschaft", Pudel, 2002, p. 29). Pudel (2000) concludes that individuals do not select their foods because they like them, but that they like them because they eat them (p. 107; see also Mela, 1999). The impact of this principle throughout the life-span is anecdotally expressed in the advice a German bus driver gave his passengers on arrival at a roadhouse that had run out of coffee: "Coffee is out, but beer and cake go well together too, you simply need to try it" ("Der Kaffee ist alle, aber Bier schmeckt auch zu Kuchen, man muss es nur versuchen"). If one does so over a number of trials, the chance will not be too low to develop a preference for this ostensibly peculiar combination.

In *flavor-flavor learning*, the preference for a food item is increased by pairing it with a taste which is already liked or decreased when it is paired with a disliked flavor. This effect has been demonstrated experimentally, for example, with vegetables that were mixed with sugar; subsequent ratings of the pleasantness of a vegetable flavor were increased even when it was later tasted unsweetened. There are indications that the acquisition of the preference for bitter-tasting foods like coffee may work in a similar way. Initially, individuals are believed to add sugar or cream to their coffee to make it more palatable, and when the flavor of the coffee becomes gradually associated with the flavor of the sugar or cream, individuals can drink and like it with less of these ingredients and finally without them. Likewise, adding a bitter-tasting substance to a given flavor will make the latter less liked (Capaldi, 1996c; Havermans & Jansen, 2007; Logue, 2004, p. 97; Yeomans, 2006).

Flavor-nutrient learning is a principle which enables individuals to associate a flavor with its nutritive consequences, most importantly with its caloric density. It seems that the denser in calories a food item is, the stronger it will be preferred. As the physiological caloric value of fat is more than twice as high as that of carbohydrates or protein (e.g., Hauber-Schwenk & Schwenk, 2000, p. 29), it is not surprising that humans learn to prefer foods with a high fat content. During human evolution, when high-caloric foods were rarely available, this was an adaptive advantage; nowadays, however, this preference turns out to be maladaptive insofar as palatable, high-fat foods are easily available at low costs and thus are eaten in much higher quantities than recommended, which results in an excess intake of energy and eventually contributes to an increase of the prevalence of overweight and obesity. It should be noted that this effect has been shown to occur separately from flavor-flavor learning, which is based on the sensory dimensions of a flavor only, not on post-ingestive consequences; still, both effects may occur jointly, for example, when food products high in fat are salted as in the case of French fries, or sweetened as in the case of chocolate (Capaldi, 1996c; Logue, 2004, pp. 92-93; Ogden, 2003, p. 34; Yeomans, 2006).

Rewarding food choice by, for example, positive adult attention can increase food preferences in children. Also, when an adult is feeding a child and is simultaneously making facial expressions of acceptance or rejection according to his or her own preference for that food may influence the amount the child consumes of that food and, subsequently, its preference for it. Neonates have been shown to be able to produce such facial expressions even before they receive their first feeding and to imitate facial expressions of adults ca 36 hours after birth (Logue, 2004; Ogden, 2003, pp. 32-33).

The preference for a food can also be increased if it is *used as a reward* for performing a specific behavior, for example, "good" behavior in experiments with children. If an attractive activity like playing is made contingent on the preceding intake of a food, however, the preference for that food can decrease. If the intake of a less preferred food like vegetables is rewarded by giving a sweet dessert afterwards, a principle which is sometimes employed by parents in an attempt to shape the food patterns of their children, the preference for vegetables may indeed increase in the short run due to instrumental conditioning, but in the long run it will most likely decrease while the children's preference for the dessert will grow. The point here seems to be that for the child the first activity, be it behaving well, drinking a fruit juice, or eating spinach, appears to be the door opener for accessing the second, otherwise not obtainable, and therefore more attractive food or activity rendering the first food or activity comparatively less preferred. A similar effect of an apparently unintended increase in a child's preference or intake, respectively, for both healthy and unhealthy foods has been demonstrated when the access to these foods was simply restricted, without applying a distinct rewarding scheme (Fisher & Birch, 1999; Jansen, Mulkens, Emond, & Jansen, 2008; Jansen, Mulkens, & Jansen, 2007; Logue, 2004, pp. 98-99; Ogden, 2003, pp. 33-34; Pudel, 2002, p. 46).

Taste aversion learning or, in animals, bait shyness is another principle that alters the preference for a food, although it may not account for very much of the total variance in everyday nutrition behavior between humans (Capaldi, 1996c, p. 54). Yet, its occurrence has some psychologically remarkable characteristics, and its effect is a widely spread and well-known phenomenon among humans (e.g., Birch, 1999, p. 55; Logue, 2004, p. 93; Schafe & Bernstein, 1996, p. 43): When a palatable food has been ingested and the person suffers from nausea or vomiting afterwards, that food will be avoided in the future. But, "the hallmark feature of taste aversion learning is the striking change that occurs in the response to a taste" (Schafe & Bernstein, 1996, p. 31). When falling ill, the hedonic valence of the originally liked flavor of the food will be reversed; that is, it will not only be avoided, it will be disliked and its subsequent perception will elicit reactions of disgust and illness. In contrast, when the ingestion of a food leads to other symptoms like, for example, diarrhea, cramps of the intestine, pain in other organs, or allergic reactions, that food will be considered as dangerous and will be avoided too, but its flavor or smell will not become disliked (Logue, 2004, p. 96; Rozin, 1996, p. 249).

In line with reasoning from evolutionary biology, taste aversion learning is based on a reaction of the body that resembles a physiological emergency brake once a poisonous food item has managed to pass all preceding checkpoints of food intake; and hence, it serves the adaptive purpose of reducing the chance to ingest that item a second time. Backing up food neophobia, taste aversion learning is more likely to occur for novel foods, and, following Logue's (2004, p. 47) notion of different lines of a body's defense (see above), it adds an idiosyncratic selection of flavors to the universally "built-in taste biases" (Rozin, 1996, p. 237, see above).

There are several issues that make this learning principle unusual and "extremely powerful" (Logue, 2004, p. 94): (a) An acquired taste aversion is often established after just one trial, specifically when the flavor is novel; (b) the time lag between tasting the flavor while ingesting the food and the gastrointestinal consequences can be as long as 24 hours; (c) taste aversions are exceedingly resistant to extinction, for example, Logue (2004, p. 93) reports that the respondents in her survey claimed to have acquired their taste aversions on average 5 years prior to their participating in the study; and, (d) it has been demonstrated experimentally in rats that taste is more readily associated with gastrointestinal illness whereas auditory and visual stimuli are more readily associated with pain, an effect which is called selective associability (Logue, 2004; Schafe & Bernstein, 1996).

Also, an acquired taste aversion appears to be quite resistant to the impact of cognitions. It is anecdotally reported (e.g., Gniech, 2002, pp. 29-31; Logue, 2004, p. 94) that in the early 1970s, American psychologist Martin E. P. Seligman fell victim to a seemingly superstitious variant of this principle when he became ill with a stomach flu after having eaten a dish of which sauce béarnaise was a component. His colleague, who had eaten a different dish without the sauce, showed the same symptoms afterwards while his wife, who had eaten a dish with the same sauce, did not. Although Seligman is reported to have been fully convinced that the sauce did not cause his symptoms, he acquired a taste aversion to it; this is why taste aversion learning is sometimes referred to as the sauce béarnaise phenomenon.

A similar effect, though in the opposite direction, has been demonstrated in animals and has been named the *medicine effect*: When a food is ingested shortly before an animal recovers from an illness, its flavor will be preferred in the future. Yet, it is not clear whether this effect also occurs in humans (Capaldi, 1996c, p. 54; Logue, 2004, p. 92).

Modeling

Modeling, or observational learning, is an important pathway for the transmission of food preferences, both in humans and in animals. It has been proven, for example, that children learn to prefer and to ingest foods when they watched other persons choosing the same foods before, specifically when these persons are of social significance for the children like their parents or peers. Another instance of observational learning can be seen in a restaurant when a guest, unfamiliar with the cuisine on offer, asks his or her companions what they are going to order, or when water consumption is experimentally increased during lunch due to an experimenter's confederate serving as a water-drinking model (Engell, Kramer, Malafi, Salomon, & Lesher, 1996; Logue, 2004; Ogden, 2003, pp. 29-32; see also Galef, 1996).

Modeling is also involved when advertising comes along with testimonials of peers or of celebrities who are of relevance to the target group, which is often the case. According to Logue (2004, p. 104), U.S. children spend more time watching television than they do engaging in any other activity and during this time they are faced with an average of 10 food commercials per hour, the majority of which advertise foods of poor nutritional properties (see also Conner & Armitage, 2002, pp. 120-121); similar figures are reported for the UK (Cox & Anderson, 2004, p. 149; see also Caraher & Landon, 2006, p. 233). Though an advertising campaign for a food product can have a clear impact on product awareness as evidenced, for example, in market research surveys and also on food preferences and consumption behavior in the short term (e.g., Cox & Anderson, 2004, p. 150; Logue, 2004, p. 104), its influence on the shaping of food patterns in the long term, specifically those bearing potential health hazards, is not at all that straightforward. Empirical evidence to support this suspicion is rare and contradictory (e.g., Caraher & Landon, 2006; Cox & Anderson, 2004, p. 150; Diehl, 1993, pp. 81-82; Logue, 2004, p. 104) although it is perpetually being entertained by, for example, parents (e.g., Pudel, 2002, pp. 40-41).

Pudel (2002) tries to refute this accusation by pursuing an unusual line of argument (pp. 41-43): He calculates that the monetary costs for repairing the effects of nutrition-related diseases in Germany sum up to ca 50 times the spending of the food industry on advertising their products, and he doubts this kind of "efficacy" of advertising efforts; an argument which gains persuasiveness when allowing for the absence of a corresponding disease-inducing intention on the industry's side. He further holds that in the former East Germany, prior to reunification, the problem with nutrition-related diseases was at least as serious as in West Germany although in East Germany, according to Pudel (2002), advertising "in a 'Western sense'" ("im 'westlichen Sinn'", p. 42) did not exist (which is not quite correct, advertising did exist to some degree, also for food products; see, e.g., Tippach-Schneider, 2004). Instead of primarily blaming advertising activities of the food industry, Pudel (2002, pp. 41-43) recommends the parents, who he suspects of trying to distract the attention away from their own failure to succeed in shaping healthy food patterns in their children, to better monitor their own nutrition behavior with which they might be a poor model to their children.

But the parents may not be necessarily the ones to blame, either. Although a child's primary socialization including the transfer of food patterns is most importantly achieved within the family context and, therefore, any culture-determined food preferences must be at least partly communicated by the parents, there is surprisingly little empirical concordance between members of a family in terms of food preferences, particularly not between parents and children. Parents, thus, appear to be quite unable to hand down their own unique preferences (Rozin, 1996, pp. 253-255; 2006, p. 27; see also Ogden, pp. 30-31). Rozin (1991, p. 93) has called this phenomenon the "family paradox". On the other hand, there is much stronger correspondence between parents and children in terms of the rejection of foods. If foods rejected by parents are not bought by them either and, therefore, do not contribute to the selection of foods available to a child, this similarity may result from the absence of an opportunity for mere exposure to take effect (Pudel & Westenhöfer, 2003, p. 42).

According to reasoning and research carried out by Rozin (1996, pp. 250-251; see also Pudel & Westenhöfer, 2003, p. 42; Rozin, 2006, p. 32), modeling also accounts for a substantial share of reversing innate aversions to unpalatable foods like burnt food, quinine water, alcohol, raw garlic, or chili pepper. Many adults do not choose these kinds of substances or foods because they believe that they are good for them, but they prefer them because their sensory properties have changed to something that they like. Rozin (1996) found that in traditional rural Mexican settings chilies are consumed in a positive affective familial context which induces a liking for their hot burning flavor in children. Interestingly, there is only little evidence that a preference for chilies can be established in animals, and if it was, social mediation seemed to play an important role. In the Mexican population studied by Rozin (1996), the family dogs had not developed a preference for chilies although they were fed them together with other discarded foods. But these dogs were not considered as pets and thus they were not treated and not fed in a positive affective context with humans.

Cognitive Learning and Nutrition Knowledge

Cognitive learning, which is another important source of influence on the formation of nutrition behavior, involves the acquisition, processing, storing, and generation of information (Hoffmann, 1999) to control nutrition behavior in a conscious manner (Pudel & Westenhöfer, 2003, pp. 46-48). As a determinant of food choice, Pudel and Westenhöfer (2003) named it "cognitive control" ("kognitive Kontrolle", p. 46) of eating behavior. It comes into play whenever an individual deliberately intends to perform a specific nutrition behavior in order to achieve a given target (p. 47), for example, buying only organic foods, eating a fat-reduced diet, or treating oneself to a bar of chocolate. Pudel and Westenhöfer (2003, p. 47) identify three determinants that generally direct nutrition behavior across the life-span: From birth onwards, internal biological signals rule but with constantly decreasing power while simultaneously external stimuli begin to become more and more important until, presumably during childhood or adolescence, they reach their peak and start to decline too. According to Pudel and Westenhöfer (2003, pp. 45-46) these external stimuli are the result of the process of primary socialization in the families when nutrition behavior is shaped to match cultural standards. Approximately at the time when the relevance of external stimuli starts to decrease, "rational (pseudorational) attitudes" ("rationale [pseudo-rationale] Einstellungen", Pudel & Westenhöfer, 2003, p. 47) gain in importance as a third cognitive component and become the strongest factor throughout the rest of life.

This cognitive component comprises nutrition-related beliefs and knowledge, where "knowledge can be seen as a ... set of strongly-held, widely-accepted beliefs" (Axelson & Brinberg, 1989, p. 36) within the scientific community of nutritionists. Consequently, beliefs have been a primary target for nutrition education but with equivocal results (e.g., Anderson, Milburn, & Lean, 1995; DGE, 2004; Pudel & Westenhöfer, 2003). Even though nutrition education campaigns have been run for decades now (Pudel, 2001), Pudel and Westenhöfer (2003) state that human nutrition behavior appears to be rather resistant to cognitive information aimed at promoting healthy eating patterns, because nutrition behavior, contrary to the layman's view, is only partly controlled by rational consideration and choice; affective aspects, for example, are often not directly addressed in nutrition education (see also Caraher & Landon, 2006, pp. 229-230). And it is particularly difficult to alter nutrition behavior in children by appealing to their insight while supplying information on, for example, the abstract risk of falling ill due to a long-term exposure to an unhealthy diet or food pattern. Children do understand and are able to recall a piece of information contained in an educational message, for example, "sugar can damage your teeth" or "eating too many French fries will make you fat", but they are unable, though, to comprehend fully its relevance to their own behavior as they are threatened with a possible outcome that may occur sometime in a future that is far beyond their own experienced temporal horizon (Pudel & Westenhöfer, 2003; see also Anderson, Milburn, & Lean, 1995; as an example for an attempt to overcome some of these obstacles cf., e.g., Pudel's 2002 book).

Anderson and her colleagues (Anderson, Milburn, & Lean, 1995) point out that for nutrition information to be effective it is vital that consumers are able to translate their knowledge into practical applications in terms of the selection and preparation of foods on a daily basis. If individuals know, for example, that they should avoid ingesting too many fatty foods, to have an effect, this knowledge needs to be complemented by information on, for example, which foods contain much or little fat or how they can be cooked with as little fat as possible.

Little debate appears to have been devoted as yet to the psychometric properties of tests measuring nutrition knowledge (for an exception see, e.g., Parmenter & Wardle, 1999); for example, it may be questioned whether 12 ("Ernährungswissen", 2005) or 13 (DGE, 2004) items in a test are representative of the universe of all possible items from a domain that is lacking clear definition. In spite of that, it appears that individuals do have some relevant knowledge (e.g., Anderson, Milburn, & Lean, 1995, p. 110), even children can classify foods appropriately according to a learned but not really comprehended system of stereotypes (e.g., Pudel & Westenhöfer, 2003, pp. 43-45). A representative survey carried out recently in Germany ("Ernährungswissen", 2005), however, claims to have detected substantial gaps in nutrition knowledge.

Other recent surveys carried out in Germany (DGE, 2004) and in the UK (Wardle, Parmenter, & Waller, 2000) have testified that nutrition knowledge is determined by, for example, sex with women being more knowledgeable than men or by SES with a higher status coming along with more knowledge. Also, there are indications that an increase in knowledge is indeed correlated with, for example, (a) physiologically more positive food patterns (DGE, 2004, pp. 68-72), (b) the intake of more vegetables and fruit and less fat (e.g., Gibson, Wardle, & Watts, 1998; Wardle, Parmenter, & Waller, 2000), (c) the intake of more healthy foods and less fast foods (Tepper, Choi, & Nayga, 1997), (d) positive breast-feeding beliefs and future intentions to breast-feed (Swanson, Power, Kaur, Carter, & Shepherd, 2006), or (e) an increase in the intention to buy iron-fortified soy sauce (Sun, Guo, Wang, & Sun, 2006).

2.2 Potential Determinants of Mineral Water Intake

The preceding sections were intended to delineate some of the distinguishable principles that have been found either to shape habitual human nutrition behavior during socialization or even to have an immediate influence on its performance in a concrete situation. The latter can occur, for example, when a person, after having been on a long walk in hot weather conditions, is in a state of strong dehydration and experiences genuine homeostatic thirst which may cause him or her to accept and drink anything potable on offer, no matter if that beverage belongs to the person's relevant set of habitually consumed products, if it promises good value for money, if its flavor is liked, or if it possesses some other usually relevant property; in this particular situation, any potable fluid may be ingested in order to quench the thirst.

Basically, all principles of the acquisition of nutrition behavior may take effect during the whole course of life, enabling individuals to constantly adapt to minor or major changes of their environment and of themselves. But most importantly, the genetic predispositions, the individual learning history including the acquisition of cultural norms and values, the impact of environmental conditions experienced throughout life, and any past interactions of them, they all merge into the psychological endowment that a *person* brings to a *situation* where he or she performs nutrition-related *behavior*. The following sections are aimed at supplying a frame of reference for the analysis of *interindividual variation in nutrition behavior* across a *given sample of individuals* in a *historically specified context.*

Nutrition Behavior: A Sequence of Forced-Choice Actions

Given the persistent abundance of easily available and storable foods in a country like Germany, the performance of nutrition behavior almost always necessitates an act of choice which is to be made not only between ingesting a food or beverage or not ingesting it but which also includes a decision between one or more possible alternative products (Pudel & Westenhöfer, 2003).

Yet, because the process of food provisioning needs to be imagined as a sequence of consecutive interdependent activities, there are decisions to be made at "each of the stages from shelf to stomach, and beyond" (Marshall, 1995b, p. 12). For example, before individuals can make up their minds and choose from what their refrigerator or a restaurant's menu offers, a variety of other decisions have to be made. Decisions are required on the kind and structure of the next meals, if any, that are planned to be prepared in the household, or else on another way of obtaining food like dining in a restaurant, eating in the household of some friends or members of the family, ordering a meal from a fast food delivery service, or eating take-away food. Individuals need to choose the shop they go to, which implies the potential availability of only a subset of all food products on the market because many products or brands are selectively sold in some supermarket chains while in others they are not; in the shop, they select from what is currently available on the shelves at the time they are shopping.

When preparing a meal at home, choices again need to be made between the foods stored in the household and the quantities with which they are used as ingredients or components of a meal. Even when a meal is on the table or on the plate, an individual may still choose to eat from one component but not from the other. By the same token, when eating out of home, decisions need to be made on the restaurant or another place to go to, on selecting from the meals and beverages offered on the menu, on whether to ask the waiter for the fulfillment of a special request, and so forth (cf. Marshall, 1995b, pp. 6-7).

In addition, decisions are often and not only in relation to children delegated to some members of a household who are designated to be responsible for food shopping and its preparation, which does not mean, however, that the delegating household members, including children, were not able to influence the food shoppers' actual choices (Kaur & Singh, 2006). The matter is made more complicated by the fact that individuals are not fully consistent in their preferences for foods and in the choices they make between them, but rather they tend to vary the foods they select for consumption in a systematic way (e.g., Conner & Armitage, 2002, p. 8; Köster, 2003). One of the principles that potentially underlie systematic variation in food choice was already explicated above: sensory-specific satiety (e.g., Hetherington & Rolls, 1996), which, in consequence, may trigger variety-seeking behavior (e.g., van Trijp, 1995; see also below).

In any case, as has already been pointed out (see chap. 1.1), humans are only suboptimally equipped to accomplish the task of food choice in a health-maintaining way under the conditions of abundantly available and easily accessible food products. It is also to be feared that Marshall (1995b) is still right with his statement that he came up with more than a decade ago about the state of affairs of research into food choice: "Despite the economic, political, social and nutritional importance of ... [food] choices relatively little is known about food choice, other than the fact that individuals are conservative in their selection given the abundance of edible foods" (p. 3).

The Personality Triad of Nutrition Behavior

Whenever individuals act within a given context or situation in relation to food or to nutrition in general, their behavioral performance may be conceived of as depending on three sources of influence: (a) the person, (b) the situation where the behavior is performed, and (c) the object the behavior is related to, that is, the food or any other nutrition-related matter (e.g., Bell & Meiselman, 1995; Conner & Armitage, 2002; Meiselman, 2006; Meiselman, Mastroianni, Buller, & Edwards, 1999; Shepherd, 1990, 1999).

The factor person encompasses interindividual differences in (a) psychological and sociological aspects like, for example, personality, attitudes, beliefs, preferences, mood, experience, habits, expectations, involvement, life-style, values, education, knowledge, or sociodemographic characteristics (e.g., age, sex, or social class); and differences in (b) physiological parameters like, for example, hunger, post-ingestive effects, satiety, hormone levels, or food allergies; and also differences in (c) sensitivity to and acceptability of sensory properties of the food as well as perceptions of its image, its value for money, and the like (Bell & Meiselman, 1995, pp. 292-299; Conner & Armitage, 2002, pp. 5-8; Meiselman, 2006; Shepherd, 1999, p. 808).

The situation or the environment may refer to such broad determinants as religion, culture, or social milieu and to economic factors like availability, price, or advertising (Conner & Armitage, 2002, pp. 5-7; Shepherd, 1999, p. 808); but it can also denote the immediate impact of characteristics of the physical surrounding (i.e., of the spatiotemporal address) within which the action unfolds like, for example, food packaging, plate shapes, menus, signs, texts providing information, decor, illumination, noise or music, efforts required to obtain food in relation to its location, or social facilitation (Bell & Meiselman, 1995, pp. 299-305; Meiselman, 2006; Wansink, 2004).

The food and its sensory properties like appearance, taste, or texture and its overall acceptance were the primary targets of the early attempts at understanding food choice. While in the meantime it has been acknowledged that other factors like social, temporal, or environmental aspects are similarly if not more crucial to food choice

(Bell & Meiselman, 1995, p. 293), the relevance of the foods and their characteristics is still appreciated. According to Conner and Armitage (2002, pp. 6-7), the physical and chemical composition of a food is relevant to food choice in three ways: (a) It strongly determines the perception of the sensory properties of the food, which, in turn, influences a food's likability in different consumption contexts; the food-specific composition of nutrients may also have (b) post-ingestive physiological consequences such as, for example, satiety or sickness and also (c) post-ingestive psychological consequences like, for example, sleepiness or alteration in mood; both of these latter effects may influence subsequent food choices and intake.

When considering these potential sources of interindividual behavioral variance it becomes apparent at first sight that they will not operate independently of each other, a fact which is also acknowledged by the authors cited above, who supply corresponding illustrations with their views of the interrelations of these factors (cf. Bell & Meiselman, 1995, p. 294; Conner & Armitage, 2002, p. 6; Shepherd, 1999, p. 808).

For example, (a) the factor food may as well be conceptualized as being amalgamated with the situation because foods are a part of the physical environment until they are ingested, and they are perceived by means of exteroception including taste and smell before and even while being ingested; (b) aspects of the environment like religion or culture will most likely operate through the person as they have been an important determinant of an individual's socialization before a specific food is eventually chosen in a given situation; (c) likewise, determining a product's value for money is not only dependent on its objective retail price, it also depends on its perceived performance which is being held against the background of an individual's expectation of that performance, which serves as a benchmark and depends itself upon, among other things, that individual's prior consumption experiences (cf., e.g., Homburg, 2001); (d) dissatisfaction with the food chosen in a given situation may cause a person to avoid or change that situation in the future or to alter the food if that is feasible; similarly, (e) if a food that has been chosen and ingested in one situation may affect physiological or psychological parameters and, in consequence, an individual's choices in subsequent situations, then there is an obvious relation between choices in both situations mediated by the individual; and finally, (f) in whichever way one might conceptualize what exactly constitutes a setting or a situation or the environment, it will not happen to an individual and exert its influence independently of that person (cf. Meiselman, 2006).

This latter point is immediately evident when thinking about the situations of an individual's food choice and intake in the course of a day or a week: The places where and the times when food is purchased, prepared, and eaten do not follow each other simply at random; quite the contrary, these places reappear in a highly stable and predictable temporal order for most people. For example, it is very usual for most people to have their breakfast, if at all, on a weekday morning, each day in the same place such as their home or their workplace, or at the most in a very limited number of different places like their home, their workplace, and the home of a friend or some member of their family. Also, the selection of food items that are available for choice in a situation like the domestic breakfast is very limited and consistent day after day without much of a surprise as it has been stocked up prior to the breakfast by the consuming person himself or herself or by the household member who is responsible for food shopping. On the other hand, people differ very much from each other in terms of where, when, and with whom they have their breakfast: Hardly anybody has breakfast with the same person at the same time and in the same place every day with the important exception of members of a person's reference groups such as members of the same household or colleagues in the workplace.

Yet, the stability of food patterns over the last few decades in Germany and in other Western societies, specifically that of the rigid three-meal regime, has been recurrently questioned in recent years because there are some indications of its general destructuration. Although the three classical meals still form the basic pattern today, it is suggested that they are increasingly being supplemented or substituted by between-meal snacks and consumption out of an individual's home (DGE, 2004; Hayn, Empacher, & Halbes, 2005; Meyer, 2002; Nestlé Deutschland AG, 1999; but cf. Mestdag, 2005), a tendency which is sometimes referred to as "snacking and grazing" or "eating on the move". But any increase in the diversity of eating places does not at all imply that they will happen to the individual in a completely unsystematic fashion, rather they will be deliberately varied to a certain degree by the person as are the foods that are consumed for a meal.

In more general terms, the question of how much of the variance in any given behavior is dependent on variance in parameters related to the person as opposed to those related to the situation attracted a lot of attention in the course of the person-situation debate (e.g., Buse & Pawlik, 1996; Epstein & O'Brien, 1985; Laux, 2003; Pervin, 2003), which was sparked off by Mischel's publication in 1968. In his book, Mischel (1968) challenged the traits of personality psychology as useful units for predicting an individual's behavioral performance in a specific situation provided the behavioral criterion was not measured via the same medium as the trait that is, not by means of another questionnaire; and also, he questioned the presence of enough cross-situational consistency of behavioral performance in different situations to warrant the existence of personality traits.

During the ensuing controversy between trait protagonists, on the one side, and situationists, on the other side, who claimed that either traits or situational factors, respectively, were the predominant determinants of an individual's behavior in a given situation, several issues were clarified, two of which are of relevance in the context of this study: First, individuals and the situations they experience throughout their lives are not orthogonal to each other; that is to say, in the extramural world outside the laboratory persons are not arbitrarily assigned to situations as has been argued already above in relation to nutrition behavior, rather individuals vary systematically in terms of the type of situations they stay in and the frequency and duration with which they do it (Pawlik, 1978). Also, they are capable of interacting with situational parameters; that is, they may select situations, learn how to deal with them, and eventually modify them effectively (e.g., Laux, 2003).

And second, much of the dispute was fueled by argumentations based on empirical data that were analyzed at the level of single acts of behavior, single occasions, single situations, or questionnaire items, all of which carry a substantial share of specific variance which is unrelated to the assumed underlying trait and thus is considered as error variance that renders the obtained measures less reliable. In consequence, when the attention was drawn away from analyzing single measures to examining aggregated scores, sufficient empirical support to the subsistence of both the predictive validity of the trait concept and the cross-situational consistency of behavior could be given (e.g., Ajzen, 2005a; Epstein, 1979, 1980, 1983; Epstein & O'Brien, 1985).

Today there no longer seems to exist much doubt about the basic adequacy and usefulness of the trait concept for the analysis of interindividual differences both in academic psychology and in industrial and organizational psychology (Funder, 2001); recently, it has been applied successfully to a wide range of real-life outcomes such as alcohol abuse or job performance (pp. 199-200). Consequently, the person-situation debate "can at last be declared about 98% over" (Funder, 2001, p. 199).

But there remains some lack of clarity about the nature and the potential number of traits (Pervin, 2003). Buse and Pawlik (1996; Pawlik, 1982) emphasize that whenever factor analysis was applied in order to derive traits, its mathematical approach to decompose the measure of a behavioral act of an individual in a specific situation or an individual's answer to a questionnaire item had always taken into account *both* the person *and* the situation, from Spearman's reasoning at the onset of the 20th century onwards; put in other words, factor-analytic research into traits was never interested in the behavioral performance of an individual isolated from the situation in which the behavior is performed. Still the number and kind of traits that can be derived from factor analyses is questionable as they depend on, among other things, the quantity and quality of the data that are submitted to the procedure. These data are usually based on questionnaire items or ratings both of which are constructed by the researcher and thus obviously reflect his or her a priori assumptions. Some researchers criticized the factor analytic approach to the determination of traits on these and other grounds, and some even polemized "that the method is comparable to putting people through a centrifuge and expecting the 'basic stuff' to come out (Lykken, 1971; Tomkins, 1962)" (Pervin, 2003, p. 64).

Despite any substantial differences between them, Ajzen (2005a) stresses the similarities between the concepts of traits and attitudes as "both terms refer to latent, hypothetical constructs that manifest themselves in a wide variety of observable responses" (p. 6). Because of this, the principle of aggregation needs to be applied to the measurement of attitudes and their corresponding behavioral criteria too in order to enhance the predictability and cross-situational consistency of behavior investigated in the context of attitudes. Ajzen (2005a, p. 88) recognizes the principle of aggregation as a special case within a wider framework of what he calls "the principle of compatibility" (Ajzen, 2005a, b) which requires both the predictor and the criterion to be measured at the same level of generality or specificity. Being at the same level, in this sense, means that both match in terms of four facets of behavior: (a) the target that the behavior or disposition is directed at, (b) the particular actions considered, (c) the context in which the action takes place, and (d) the time when the action occurs (pp. 85-86). This principle seems to correspond to the bandwidth concept of a trait (e.g., Pervin, 2003, p. 62): The wider the range of behaviors is that is covered by a trait measure, the wider the range of behaviors needs to be which make up the measure of the behavioral criterion and which may need to be sampled on different occasions or in different situations in order to arrive at a high level of predictive validity. In consequence, a trait or attitude measure with a wide bandwidth will often have little fidelity, that is, it will be a poor predictor of a particular behavior in a specific situation (e.g., Pervin, 2003, pp. 434-435).

From the point of view of personality psychology, the distinction between the person, the situation, and the food as potential determinants of an individual's food-related behavior may as well be shortened to the three elements that constitute the "personality triad" (Funder, 2001, p. 210) of the empirical study of personality: (a) the person, (b) the situation *including* the food, and (c) the food-related behavior. There is no clear-cut rule that helps to decide which of these elements might be the better candidate to serve as the dependent variable in empirical research because all three are inevitably interrelated to one another, a fact which is acknowledged by interactionism which tries to integrate the positions of the trait protagonists and the situationists (e.g., Buse & Pawlik, 1996; Laux, 2003).

In any case, the personality triad is unbalanced in terms of the attention that has been paid by psychologists to its three elements in research and theory up to now. While many efforts were made to measure and characterize the psychological structure of persons resulting in a huge body of findings that allow for detailed analyses of differences between and within persons (cf., e.g., Amelang & Bartussek, 2001; Laux, 2003; Pervin, 2003), comparatively little is known about situations and even less about behaviors (Funder, 2001), specifically when both are investigated in the natural environments of real life outside the laboratory (Pawlik, 1978, 1988).

As for the situations, there is no generally accepted classification system available that allows for the psychological separation of one naturally occurring situation from another; instead, what constitutes a situation is usually defined individually by the researchers according to the particular objectives of their studies (Buse & Pawlik, 1996; Meiselman, 2006; Pawlik & Buse, 1996; see also Schwenkmezger, Eid, & Hank, 2000). Buse and Pawlik (1996; Pawlik & Buse, 1996), for example, make a distinction between a setting, which denotes the objectively identifiable physical and social criteria that make up the spatiotemporal address where a behavior is performed but without making a reference to this behavior, for example, being at home in the living room with the family, and a situation, which is a combination of a setting and a centrally performed behavior, for example, being at home in the living room and having breakfast with the family (cf. Buse & Pawlik, 1996, pp. 274-275; Pawlik & Buse, 1996, p. 362). Funder (2001) criticizes the approach researchers typically make when they try to account empirically for a situation's influence on a behavioral criterion by applying simple subtraction: All variance in a behavioral criterion in a given study that cannot be explained by the personality variables measured in the study "is assigned to the situation by default" (p. 211) even if no situational parameters were ascertained; but by the same token, the residual variance might equally well be assigned to personality variables not measured in the study or to error of measurement.

Behaviors, the third component of the personality triad, are inescapably embedded in situational contexts in which they are performed, and similar to the case of situations, it appears to be a scientific challenge to identify one behavioral segment reliably and discern it meaningfully from another in the stream of naturally occurring behaviors and experiences under real-life conditions (Buse & Pawlik, 1996; Pawlik, 1988; Pawlik & Buse, 1996).

Pawlik (1988; see also Pawlik & Buse, 1996) elucidates six peculiarities that characterize a person's stream of behavior and experience in his or her natural habitat and that need to be taken into consideration when planning to explore it: First, when individuals move through their habitats, their natural stream of behavior is nonstationary in space and thus requires mobile equipments for data collection. Second, the stream of behavior unfolds continuously over time and can feature behaviors or experiences like moods which may vary reliably within less than a second and which may continue to do so for minutes or hours without giving an observer an intuitively appealing cue for its segmentation and recording. Third, the stream of behavior cannot be recorded meaningfully as a single score because it unfolds in more than one dimension and hence it needs to be subdivided ex ante into significant behavioral elements or variables according to the purpose of the study and based on results of preliminary studies if necessary.

Fourth, as behaviors unfold over time, a coherent sequence of them may constitute an intentionally executed action which is aimed at attaining a particular goal, and several different behavioral sequences can be imagined to be aimed at achieving the same objective and thus to represent different variants of the same action. For example, the feeling of homeostatic thirst may trigger fluid-seeking behavior with the purpose of quenching the thirst, yet many sequences of behavior may be carried out to attain this goal; while some persons may buy mineral water from a kiosk and drink it from the bottle, others may squeeze out the juice from oranges and pour it into a glass to drink it, while some others may still drink water straight from their bathroom tap using their hands to collect it. All of these different sequences of behavior represent behavioral transpositions of the same action. Things can become more complicated when one action is nested in another, for example, when making fresh orange juice in the kitchen forms an integrated part of the overarching action of breakfast preparation for the family; also, an action may be carried out in parallel with another action as may be the case, for example, when getting mineral water from the kiosk and drinking it is executed while being busy with an ongoing discussion with an accompanying friend.

Moreover, when ascertaining the stream of behavior in situ, simultaneous recording of any relevant setting parameters is required as well to understand how behavior unfolds in relation to variations in its potential situational triggers and barriers. Finally, many periods of the stream of behavior are not intended to be perceivable publicly, specifically when they unfold in the privacy of a person's home. In order to gain access to the behaviors performed in these situations too, it is not only necessary to obtain the consent of the participants, which is obligatory anyway from both the ethical and the legal points of view, but it is practically inevitable to make them observe and record their behaviors themselves instead of deploying other persons as observers.

In spite of the irresolvable interrelations between the persons and the environments they live in, Buse and Pawlik (1996, p. 274; see also Funder, 2001) advocate the separation of person-related versus situational sources of variance and the determination of their relative shares of explained variance in empirical research into naturally occurring inter- and intraindividual differences in human behavior and experience.

The remaining sections in this chapter will review findings from previous research into determinants of food consumption in an affluent society like Germany. Because to date there has already been published a huge body of detailed though not very much interrelated results on the topic in the scientific literature, only an anthology of some prominent findings including an outline of their underlying theoretical concepts can be given. The overview will focus on approaches and theories that may be hypothesized to be of particular importance to the objective of the present study because they seem to be matured enough to have the capability of predicting mineral water consumption and to foster the understanding of interindividual differences in mineral water intake. Consequently, whenever they are available, special attention will be paid to results related to beverage or mineral water consumption.

Person-Related Determinants of Nutrition Behavior

Global Personality Traits

Although an agreement on a definition of the trait concept will hardly be achievable, in most general terms, traits may be imagined to be broad and temporally stable dispositions of an individual that determine his or her particular behaviors consistently across a variety of situations (cf., e.g., Ajzen, 2005a; Amelang & Bartussek, 2001; Colman, 2003, p. 750; Pervin, 2003); and they may be seen "as constituting the basic units for describing individual differences in personality" (Pervin, 2003, p. 67). On the face of it, it seems to be a promising idea, therefore, to turn to personality psychology and look for contributions that general personality traits might be able to make to the explanation of interindividual differences in nutrition-related behavior (Diehl, 1993, pp. 80-81). Attempts of this kind were in fact made in the early years of research into food choice and its potential outcomes like overweight and obesity.

For example, Shepherd et al. (Shepherd & Farleigh, 1986; Shepherd, Farleigh, & Stockley, 1985) explored the relationship between salt intake and personality measures obtained from Cattell's 16PF questionnaire and from the Eysenck Personality Inventory. They found correlations between the intake of salt and the second order factors Anxiety and Tough Poise from the 16PF and the Extraversion and Neuroticism scales from the Eysenck Personality Inventory, respectively, but their absolute values did not exceed $r = .46$ at the most, and the results were not fully unambiguous in the authors' own view. Diehl (1980, pp.106-109; 1993, p. 81) reviewed a couple of studies with similar objectives, but overall, their findings resemble those reported by Shepherd et al. (Shepherd & Farleigh, 1986; Shepherd, Farleigh, & Stockley, 1985): Correlations between personality and nutrition-related variables were either not significantly different from zero or only of low values without much practical explanatory relevance, and the results were not fully consistent, either.

Because the majority of these studies may be presumed to have been designed without paying adequate attention to the principles of aggregation or compatibility (see above), it is not surprising to see that their results are merely touching or marginally breaking the "presumed .30 barrier" (Epstein & O'Brien, 1985, p. 516) for the magnitude of correlation coefficients which are typically obtained when attempting to predict items of very specific behavior from measures of broadband traits (e.g., Ajzen, 2005a; Epstein, 1979, 1980, 1983; see also Mischel, 1968). Ajzen (2005a) summarized that this endeavor "has, as a general rule, turned out to be a frustrating experience ..., and many an investigator has given up in despair" (p. 36).

Recently, other authors (van den Bree, Przybeck, & Cloninger, 2006) did find some associations between personality measures obtained from the Temperament and Character Inventory TCI and more or less healthy eating patterns derived from claimed frequencies of the consumption of 90 items or groups of food, but most of them vanished as soon as demographic and life-style variables were taken into account.

Diehl and his colleagues (Diehl, Paul, & Daum, 1984) reviewed dozens of studies which had targeted the interrelation between relative body weight (i.e., the ratio of body weight to body height or the deviation of the body weight from a predefined norm, respectively) and scores on psychometric personality scales like those from the Minnesota Multiphasic Personality Inventory MMPI and from other instruments like, for instance, anxiety and depression scales. The rationale behind this approach is that a positive energy balance (i.e., when an individual's energy expenditure is lower than his or her energy input), which may lead ultimately to an increase in body weight up to severe forms of obesity, can be readjusted either by changing food patterns, particularly by decreasing the intake of foods which are dense in energy, or by increasing physical activities like exercise or labor. For accomplishing the former, and in the opinion of the authors the more easily achievable, goal (Diehl, Paul, & Daum, 1984, p. 220), it might be helpful to know whether there exist any significant differences in personality structure between persons having an unproblematic body weight versus those being overweight or obese. From their meta-analysis, these researchers concluded that the relationship between personality and relative body weight is statistically insignificant or at least inconclusive with the exception of severely obese individuals who tend to score above the test norms on nine of the ten clinical scales of the Minnesota Multiphasic Personality Inventory MMPI.

Diehl and Paul (1985) also conducted primary research in Germany with the Freiburg Personality Inventory FPI to complement the findings from their literature review. After having controlled for age and education, these authors drew the conclusion "that (as long as there are no severe degrees of obesity) the individual's deviation from a medical or aesthetical body weight norm is virtually independent from personality traits" (Diehl & Paul, 1985, p. 14) as measured by the Freiburg Personality Inventory FPI. Two decades later, other authors arrived at very similar bottom lines regarding overweight, obesity, and control of body weight (Ajzen, 2005a, p. 37; Pudel & Westenhöfer, 2003, pp. 136-137).

While salt intake or the preference for particular food items may be much too specific a behavior to be predictable from personality traits, research conducted into potential determinants of body weight is complicated by the fact that the criterion is not an observable behavior but a potential outcome of various behaviors which food patterns are only part of. With respect to fluid intake, unfortunately, the relationship between personality measures and beverage consumption has been explored only rarely, with the exception of research into alcohol abuse (Diehl, 1993, p. 81).

In conclusion, Diehl (1993, p. 81) corroborated what he had prefigured already years earlier (Diehl, 1980, p. 109): Food preferences as well as the kind and volume of consumed foods and beverages appear to be largely independent of personality measures ascertained by means of questionnaires.

In the meantime, however, some nutrition-specific traits or trait-like dispositions have been suggested that claim to influence clinically inconspicuous nutrition behavior, and corresponding scales or questionnaires have been developed to measure them. Among those which have attracted considerable attention in the scientific community are (a) dietary restraint, (b) variety-seeking tendency, and (c) food neophobia, all of which have been found to be dispositions of long-term stability over periods of many months and also across major changes in life-style (Cox & Anderson, 2004, p. 157; Meiselman, Mastroianni, Buller, & Edwards, 1999).

Dietary Restraint

From the beginning of written history onwards, virtually all aspects of the female body have been regarded as something to control, to master, and to reshape. Until the 1960s, attempts to achieve this goal were made mainly by utilizing mechanical devices like, for example, corsets, breast-binding, bras, or in China foot-binding (Ogden, 2003). In the 1960s, however, "women were allowed and even expected to release their bodies and to resort to the natural support of flesh and muscles. And then there came the bikini and along with it ['manifestly anorectic' ("die manifest magersüchtige", Pudel & Westenhöfer, 2003, p. 196)] Twiggy was launched enthusiastically onto the fashion scene. Suddenly at the beginning of an era of natural control and natural support, women were told that they should not have any flesh to control or support" (Ogden, 2003, p. 106).

Whereas the proportion of fabric-covered areas of the body, be it with beach-wear or with other types of clothing, was gradually reduced, the ideal of a body's beauty was not relinquished. Being generally slim while having a socially acceptable pattern of fat distribution at the same time has been and still is both a prerequisite for and an indicator of being high-capacity, attractive, and happy (Pudel & Westenhöfer, 2003, p. 194). This ideal is communicated by the various media, and according to Ogden (2003), it is created and perpetuated by what she calls the "dieting industry" (p. 107) which encompasses the senders of corresponding messages like, for instance, book authors, magazine publishers, dieting clubs, or the food industry. To comply with the changing whims of the fashion world from the 1960s onwards, women who were dissatisfied with their bodies now "had to change their actual bodies and this is where dieting raised its head" (Ogden, 2003, p. 106).

It is noteworthy that in affluent Western societies the liberation of the female body from mechanical devices for the correction of its shape and from social constraints to veil most of its parts behind clothes coincides historically with an increasing availability of foods that are dense in calories and thus put individuals at an increasing risk of becoming overweight or obese, which is synonymous with an increasing likelihood of developing physical characteristics that are considered as something that *requires* reshaping (cf. Diehl, 1993, pp. 71-72).

When body dissatisfaction creates a desire to change the shape and to reduce or at least to maintain the weight of one's body, this aim can be achieved either by increasing energy expenditure or by decreasing energy (i.e., food) intake, although most likely, successful weight reduction will require extensive behavior modifications in both domains (cf., e.g., the self-report of former German state secretary Fischer, 1999). Decreasing energy intake translates into dieting which, in turn, implies cognitively controlling and overriding signals of hunger or appetite. A temporarily stable food pattern of eating less by being recurringly on a low-calorie or otherwise slimming diet or by habitually integrating dieting behavior into everyday nutrition behavior is called, at the level of overt behavior, *restrained eating* (Conner & Armitage, 2002, pp. 81-82; Ogden, 2003, pp. 113-114; Pudel & Westenhöfer, 2003, pp. 177-179).

At the trait or disposition level, the intention or tendency to establish and to maintain such a food pattern by exercising cognitive control over one's eating behavior is called *dietary restraint* (e.g., Hill, Weaver, & Blundell, 1991; Pudel & Westenhöfer, 2003, p. 178; Smith, Williamson, Bray, & Ryan, 1999; Stunkard & Messick, 1985, p. 78; Tepper, Choi, & Nayga, 1997; Westenhöfer, 1991; Westenhöfer, Stunkard, & Pudel, 1999), *cognitive (dietary) restraint* (e.g., De Castro, 1995a; Lähteenmäki & Tuorila, 1995; Lauzon et al., 2004; McLean, Barr, & Prior, 2001; Moreira, de Almeida, & Sampaio, 2005; Stunkard & Messick, 1985, p. 71), or *cognitive control of eating behavior* ("kognitive Kontrolle des Eßverhaltens", Pudel & Westenhöfer, 1989; Stunkard & Messick, 1985, p. 76).

Dietary restraint has been found to be widely spread in affluent Western societies particularly among females but also among males and even in adolescents and in children as young as nine. The wish to restrain one's eating is basically driven by two motives: (a) maintaining health or preventing diseases and (b) complying with perceived aesthetic norms in general, which means maintaining or increasing physical attractiveness for other persons in particular. The other side of this coin is that, as individuals aim at reducing or maintaining their body weight, dietary restraint and dieting behavior are associated with alterations in nutrition behavior and, in consequence, in the composition of nutrient intake, which have been found to put individuals at the risk of becoming affected by nutrient deficiencies (i.e., reduced ingestion of, e.g., zinc, calcium, magnesium, folate, or vitamins due to lower consumption rates of, e.g., fruit, vegetables, cereals, or dairy products) while living in an environment of abundantly available foods (e.g., Cox & Anderson, 2004; Diehl, 1993; Kroke & Günther, 2006; Ogden, 2003; Pudel & Westenhöfer, 2003).

At least since the onset of the 20th century, overweight and obesity have been recognized as a major health hazard; U.S. life-insurance companies were among the first who found a positive relationship between overweight and mortality (Pudel & Westenhöfer, 2003). One measure to determine whether a person is overweight or obese is the body mass index (BMI), which is defined as the ratio of the body weight to the squared body height (BMI = kg / m^2; e.g., RKI, 2005a, p. 7). This parameter appears frequently in research reports, but it does not, however, take the proportion of body fat explicitly into account, although the volume of fat and its pattern of distribution, but not weight per se, are considered as the main causes for diseases associated with overweight and obesity. Several other ways of estimating the share of body fat have been developed instead, for example, measuring waist circumference or bioelectrical impedance (e.g., Ogden, 2003; Pudel & Westenhöfer, 2003; RKI, 2005a).

According to WHO guidelines, BMI values between 18.5 and 24.9 are considered as normal weight, overweight is defined as BMI values ranging from 25.0 to 29.9, and values of 30.0 and above indicate obesity (e.g., Ogden, 2003, p. 133; RKI, 2005a, p. 8). Results from large-scale health surveys reveal that more than half of the German population is at least overweight, and ca 20% are obese (RKI, 2005a, p. 9). While BMI, overweight, and obesity increase with increasing age, the prevalence of obesity decreases with increasing social status; also, younger cohorts are more affected by obesity than older generations. The variation of BMI values above the range of normal weight (i.e., BMI >= 25) is clearly associated with an increased morbidity and mortality risk. These relationships are similar in other affluent countries like the US or the UK (e.g., DGE, 2004; Diehl, 1993; Ogden, 2003; RKI, 2005a; Seidell & Visscher, 2004).

In contrast to the increasing epidemic-like prevalence of obesity in the population, the positive image of corpulent persons in Germany as being, for example, wealthy, successful, humorous, or even-tempered people has faded throughout the last few decades. Also, there has emerged a large discrepancy between real and ideal weight, particularly in females. The ideal body weight of a woman, from the female point of view, corresponds to a BMI between 18 and 20, but less than 20% of all women in Germany have a BMI in that range; and only women with a BMI below 20, as opposed to those with a higher value, do not want, on average, to reduce their body weight (Pudel & Westenhöfer, 2003, pp. 194-198). But also in men, Pudel and Westenhöfer (2003) detected a "collective dissatisfaction" ("kollektive Unzufriedenheit", p. 197) with their own body weight. Obviously, the strong social pressure to have a slim and "good looking" body tends to make both women and men feel dissatisfied with their own physical appearance, which leads to a widely spread "collective dieting behavior" ("kollektives Diätverhalten", Pudel & Westenhöfer, 2003, p. 190). Ironically, men appear to prefer women with a body weight that is clearly above the weight that women themselves wish to have and that they believe men prefer (Diehl, 1993, p. 72).

The theoretical framework within which the concept of dietary restraint was developed is named *restraint theory*, which is concerned with the explanation of food intake, particularly in relation to overweight, obesity, and disinhibition of control of eating behavior. One key issue in this context that needs to be understood psychologically at the individual level is the apparent coexistence of (a) perceived social pressure to reduce one's own body weight, (b) dietary restraint, and (c) overweight or obesity in the same population. Not quite unexpectedly, the interrelations between these phenomena have been found to be complex. For example, it has been demonstrated experimentally that individuals scoring high on dietary restraint are indeed able to eat less or at least not more than unrestrained eaters; but under certain conditions as when a person ingests a high-calorie preload (i.e., a food given to that person in an experimental mock taste test) prior to being offered another food for ad-libitum consumption or when a person experiences emotional distress, restrained eaters may loosen their self-imposed control and disinhibition of eating behavior may occur, which can result in overeating. In fact, overeating has been described as a behavioral feature that is characteristic of restrained eaters, and consequently dietary restraint has been suggested to be a determinant of obesity (e.g., Conner & Armitage, 2002; Ogden, 2003; Pudel & Westenhöfer, 2003; Westenhöfer, 1996).

While trying to disentangle some of the seemingly contradictory findings related to dietary restraint, Westenhöfer (1991, 1996) put forward a differentiation between two aspects of restraint, namely rigid versus flexible control. Individuals exercising rigid control are characterized by following a dichotomous "all or nothing" principle: They either adhere to a strict dietary regime or they do not care very much about what and how much they eat; they either have a meal or they skip it; they tend not to respect their own needs related to food, and their expectations of the success of a diet may be unrealistically high. Flexible control means that individuals try to restrain their daily food intake while enjoying the full variety of foods; when they eat more than they intended, they will try to cut down on the size of the next meal; they tend to select low-calorie foods; in general, they incorporate dieting into their daily food-related routines (Pudel & Westenhöfer, 2003, pp. 214-216; Westenhöfer, 1991, p. 53). High rigid control has been found to be associated with, for example, high BMI and more frequent binge-eating episodes; high flexible control, on the other hand, is associated with low BMI and less frequent binge-eating episodes (Smith, Williamson, Bray, & Ryan, 1999; Timko & Perone, 2005; Westenhöfer, Stunkard, & Pudel, 1999).

There are three established instruments available to determine where a person stands on the trait of dietary restraint (Pudel & Westenhöfer, 2003; Westenhöfer, 1996): (a) the Restraint Scale (Herman & Polivy, 1975), (b) the Dutch Eating Behavior Questionnaire (van Strien, Frijters, Bergers, & Defares, 1986; German version by Grunert, 1989), and (c) the Three-Factor Eating Questionnaire (Stunkard & Messick, 1985). The latter questionnaire is also obtainable in a translated, validated, normed, and published German version ("Fragebogen zum Eßverhalten" [FEV], Pudel & Westenhöfer, 1989) of which "Scale 1: 'Cognitive control of eating behavior, restrained eating behavior'" ("Skala 1: 'Kognitive Kontrolle des Eßverhaltens, gezügeltes Eßverhalten'" [FEV scale 1], Pudel & Westenhöfer, 1989, p. 7) was used for ascertaining dietary restraint in the present study (for item wordings see Appendix B1, Questions H33, H34, and H35).

This scale comprises 21 items, summated scores can range from 0 to 21 points. Persons scoring high on the scale are characterized by a distinctly restrained and to a large extent cognitively controlled eating behavior, while those with low scores tend to exhibit spontaneous unrestrained eating behavior that is controlled by appetite and satiety (Pudel & Westenhöfer, 1989, p. 8). The scale does not, unfortunately, allow for the separation of rigid from flexible control. Pudel and Westenhöfer (1989, p. 33) recommend to administer the FEV not only in the context of clinical research but also when carrying out basic research.

Cognitive dietary restraint measured by the Three-Factor Eating Questionnaire (i.e., the original English version of the FEV scale 1) was found to show substantial convergent validity with the restraint subscale of the Dutch Eating Behavior Questionnaire and with actual energy intake (Hill, Weaver, & Blundell, 1991, p. 190; Westenhöfer, 1996, pp. 27-28; Williamson et al. 2007). Pudel and Westenhöfer (2003, pp. 200-203; Westenhöfer, 1996, pp. 30-33; see also Pudel & Westenhöfer, 1989) found that higher scores on the German FEV scale 1 were associated with lower energy intake, in general, and with lower fat intake, in particular (cf. Tuschl, Laessle, Platte, & Pirke, 1990), which were derived from 7-day dietary diaries that respondents kept while living in their natural environments ($N > 45{,}000$; ca 85% women), and that higher scores tended to be associated with lower BMI ($N > 35{,}000$; women only).

In addition, high scores on the restraint scale of the Three-Factor Eating Questionnaire were found to be associated with, for example, (a) higher consumption of vegetables and less intake of energy (Moreira, de Almeida, & Sampaio, 2005); (b) lower overall food intake, especially with lower intake of fat and carbohydrate, and with lower estimated stomach contents (De Castro, 1995a; Legg, Puri, & Thomas, 2000); (c) healthier eating patterns (van den Bree, Przybeck, & Cloninger, 2006); and (d) higher 24-hour urinary cortisol excretion in healthy premenopausal women lending support to the hypothesis that constantly trying to monitor and control food intake may result in the experience of more distress as opposed to exercising less control (McLean, Barr, & Prior, 2001).

When analyzing consumer survey data by means of path analyses, higher scores on FEV scale 1 were found to be positively related to the image of fruit yoghurt and negatively to that of Coca Cola, both of which, in turn, influenced claimed intensities of their respective consumption in a positive direction; however, FEV scale 1 scores were directly related neither to consumption intensities nor to BMI (Riepe & Lamprecht, 2001; cf. Davis, Patte, Levitan, Reid, Tweed, & Curtis, 2007). In another study, cognitive restraint was found to be related to the reported, but not to the desired, use of certain food groups like butter or margarine (Lähteenmäki & Tuorila, 1995).

Furthermore, based on a six-item short form of the restraint scale of the Three-Factor Eating Questionnaire, high cognitive restraint scores were associated positively with the consumption of green vegetables and negatively with French fries and sugar consumption (Lauzon et al., 2004); using a different six-item version of the scale, Tepper, Choi, and Nayga (1997) found that high restrainers were more likely to consume "healthy" foods and less likely to ingest whole-fat dairy or meat products, eggs, fast foods, fats and oils, and regular sodas. Consistent with this latter finding, Tuorila, Pangborn, and Schutz (1990), who investigated differences in beliefs and food consumption patterns between users of regular versus diet sodas, concluded "that users of diet sodas constitute a population whose food consumption is regulated by various constraints, worries and guilt" (pp. 6-7).

Variety-Seeking Tendency

The theme of variety seeking is not new to the analysis of consumption behavior; it has been sounded at least since the first half of the 19th century when British economist Senior stated in his law of variety that consumers' desires are aimed more at diversity than at quantity (Helmig, 2001, p. 311). Variety-seeking *tendency* as a person-related, trait-like disposition is concerned with the explanation of variation in observable product choice *behavior* (cf., e.g., Haseborg & Mäßen, 1997; McAlister & Pessemier, 1982), particularly in the context of the selection and consumption of food products (e.g., Bänsch, 1995; Cox & Anderson, 2004; van Trijp, 1995).

Variation in food choice behavior can be observed when a person's purchase or intake behavior is monitored over time: Regular consumers of a given food category vary their choices across occasions within their relevant sets of products. An individual's relevant set consists of all products from a category that can be substituted for each other because they promise to be capable of satisfying the same need state. For example, regular consumers of ice cream products are unlikely to eat exclusively one type, brand, or flavor of ice cream, or when preparing hot dinner, hardly anybody will always prepare either rice or potatoes or pasta as the starchy side dish; rather, individuals are most likely to vary their choices. A basically brand-loyal consumer of a particular chocolate-coated industrial ice cream lolly with a vanilla-flavored core usually bought from a kiosk may eat, from time to time, a scooped strawberry-flavored ice cream in a cup with a topping of whipped cream on a bed of fresh strawberries from an ice cream parlor; and even the most convinced user of mashed potatoes might double-check their suitability as a starch component to go with Chinese chop suey.

Variety seeking refers to comparatively short-term alterations in product choice as opposed to long-term changes of consumption styles across the life-span (Bänsch, 1995, pp. 343-344). These short-term fluctuations can roughly be subdivided into two categories: derived varied or extrinsically motivated behaviors versus direct varied or intrinsically motivated behaviors. Extrinsically motivated behaviors may be performed due to a wide range of reasons all of which have one thing in common: They are aimed at an expected increase in utility or satisfaction resulting from the immediate consequences of the behavioral change; the change, in this case, is a means to the end of attaining or avoiding an anticipated state or goal. Reasons of this kind can be, for instance, unavailability of the previously chosen product or dissatisfaction with its performance, an increase of its price, a decrease of a competing product's price, or a change in a household's nutrition-related budget between two purchase occasions, time constraints on the purchase or consumption situation, differing needs or changing preferences of different household members, and so forth (Bänsch, 1995; McAlister & Pessemier, 1982; van Trijp, 1995). This is what variety-seeking tendency is *not* about.

In the context of the present study, in contrast, it is related to intrinsically motivated behavioral variation which van Trijp (1995) called "true variety-seeking behavior" (e.g., p. 11). "Variation in behavior is intrinsically motivated if the consumer engages in this behavior for the value inherent in the process of brand [or product] switching per se" (van Trijp, 1995, p.6); switching behavior, in this case, "is rewarding in and of itself" (McAlister & Pessemier, 1982, p. 314), regardless of which specific product is chosen and what the consequences of its consumption might be. It is not dependent on changes in preferences for products, brands, or flavors, it is performed "because the consumer 'simply' wanted to have 'something different'" ("weil der Konsument 'einfach mal etwas anderes' haben wollte", Helmig, 2001, p. 311). It should be noted, however, that in empirical research, extrinsical and intrinsical sources of motivation may be hard to separate from each other as they may both exert their influence simultaneously on the same behavioral act (Bänsch, 1995, p. 344).

Variety-seeking behavior in relation to product consumption is conceptualized as a special case of exploratory behavior that is driven by (a) boredom with routinized choice behavior, (b) satiation with a product's hedonic attributes, or (c) curiosity due to uncertainty about the hedonic and instrumental value of a specific product alternative that was not chosen on the last consumption occasion (van Trijp, 1995, pp. 76-81). Central to the notion of variety-seeking tendency is the idea of an optimal stimulation level which individuals differ in and which they tend to maintain. When the actual level of external stimulation is below the preferred level, a person will try to bring the actual level into closer correspondence with his or her idiosyncratic optimal level by increasing external stimulation through an act of variation in consumption behavior (van Trijp, 1995; also, e.g., McAlister & Pessemier, 1982; Steenkamp & Baumgartner, 1992).

On the one hand, variety-seeking tendency appears to exert some influence when fashionable or socially conspicuous articles like, for instance, clothing, pop music, or perfumes are selected; but on the other hand, it seems to play a leading role particularly in the determination of choice behavior in relation to goods or services that stimulate many senses at the same time as is the case with certain types of voyages, like cruises, or with foods. And in affluent societies with their overwhelming quantity and diversity of food products on offer, there is comparatively little risk of inadequate need satisfaction associated with choosing different food items on different buying occasions because the vast majority of these items meet consumers' elementary expectations (Bänsch, 1995; van Trijp, 1995).

It was found, for example, that consumers who ate or bought many different items of one food category like brands or varieties of bread spreads, cheese, soups, vegetables, or sodas tended to consume many of the other categories too, a result which confirmed at least some moderate cross-product consistency of variation in food choice behaviors (correlations ranged from $r = .25$ to $r = .60$, $p < .01$; Rozin & Markwith, 1991; van Trijp, Lähteenmäki, & Tuorila, 1992). But it was also found in several studies that not all categories of food products were able to trigger variety-seeking behavior to the same degree (van Trijp, 1995, p. 101). For example, van Trijp (1994; see also Inman, 2001; van Trijp, Hoyer, & Inman, 1996) could demonstrate that variety-seeking behavior is more likely to occur for food products that vary substantially in terms of their sensory appeal (e.g., *types* of soup like tomato, mushroom, or chicken soup, or *types* of nonalcoholic beverages like cola, bitter lemon, or mineral water) as opposed to those that show only slight sensory variation (e.g., *brands* of tomato soup or *brands* of mineral water).

Variety in food intake forms an essential aspect of an omnivore's nutrition, and one of the principles that may underlie systematic variation in food choice was already explicated above: sensory-specific satiety (e.g., Hetherington & Rolls, 1996; see also chap. 2.1). Variety-seeking tendency is hypothesized to be closely related to this concept (e.g., Cox & Anderson, 2004; Lähteenmäki & van Trijp, 1995) because sensory-specific satiety results in the state of a suboptimal stimulation level which "can effectively be resolved by switching to products with dissimilar sensory attributes" (van Trijp, 1995, p. 105). This assumption is supported by the above-mentioned findings (Inman, 2001; van Trijp, 1994; cf. Zandstra, de Graaf, & van Trijp, 2000) indicating that consumers tend to switch more intensively between the different levels of a "sensory-interactive attribute" (Inman, 2001, p. 117) like flavor as opposed to different levels of an attribute like brand, which usually do not cause comparable variability in sensations, provided that the flavor is kept constant.

There exist several well-established methods for measuring and modeling variety-seeking behavior (e.g., Haseborg & Mäßen, 1997; Helmig, 2001; van Trijp, 1995); among them is van Trijp's (1995; see also van Trijp & Steenkamp, 1992) variety-seeking scale (VARSEEK-scale) which is intended "to quantify consumers' variety-seeking tendency with respect to foods" (van Trijp, 1995, p. 135). This 8-item scale was thoroughly developed according to the standards of psychology's classical test theory (cf., e.g., Gulliksen, 1950; Lienert, 1989). While adhering explicitly to Ajzen's principle of compatibility (van Trijp, 1995; cf. Ajzen, 2005a; also, see above), the VARSEEK-scale is conceptualized as a domain-specific instrument with a narrow bandwidth to ascertain true (i.e., intrinsically motivated) variety-seeking tendency in food choice.

Van Trijp and his colleagues made use of confirmatory factor analysis, in addition to the traditional techniques of test construction, to determine, for example, the unidimensionality, temporal stability, and construct validity of the scale (Steenkamp & van Trijp, 1991; van Trijp, 1995; cf. Homburg & Giering, 1998). These authors (van Trijp, 1995, pp. 142-154; see also Steenkamp & van Trijp, 1991; van Trijp, Lähteenmäki, & Tuorila, 1992; van Trijp & Steenkamp, 1992) managed to demonstrate the convergent and discriminant validity of the VARSEEK-scale within a nomological network operationalized by means of (a) indicators of an optimal stimulation level in general, (b) indicators of an optimal stimulation level in relation to consumption behavior in particular, and (c) indicators of variation in actual food choice. They found, for example, scores of the VARSEEK-scale being significantly stronger associated with three out of four measures of claimed variability in actual food choice than Zuckerman's Sensation Seeking Scale (e.g., Zuckerman, 1994; cf. Amelang & Bartussek, 2001; Schneider & Rheinberg, 1996), which is a broader measure (i.e., not specifically conceptualized in the context of food choice) for ascertaining behavior aimed at restoring an individual's optimal stimulation level (van Trijp, 1995, pp. 147-148).

The VARSEEK-scale appears to have been developed and initially used in a Dutch version. There is an English translation available (e.g., van Trijp, 1995, p.139), which was also applied in empirical research (Meiselman, Mastroianni, Buller, & Edwards, 1999); there was a Finnish translation used (e.g., Lähteenmäki & van Trijp, 1995; van Trijp, Lähteenmäki, & Tuorila, 1992); and recently, the scale was translated into German, and its psychometric properties were examined (Riepe, 2003). In the present study (see Appendix B1, Question H32), the items were administered using a 7-point rating scale that ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Thus, scale scores could range from 8 to 56 points with higher scores indicating a higher degree of intrinsically motivated variety-seeking tendency in food choice. Wordings of the items in English and in German are shown in Table 1.

Table 1

Item Wordings of the VARSEEK-Scale

English
1. When I eat out, I like to try the most unusual items, even if I am not sure I would like them.
2. While preparing food or snacks, I like to try out new recipes.
3. I think it is fun to try out food items one is not familiar with.
4. I am eager to know what kind of foods people from other countries eat.
5. I like to eat exotic foods.
6. Items on the menu that I am unfamiliar with make me curious.
7. I prefer to eat food products I am used to. (R)
8. I am curious about food products I am not familiar with.
German
1. Wenn ich zum Essen ausgehe, probiere ich gerne die ungewöhnlichsten Speisen aus, auch wenn ich nicht sicher bin, dass ich sie mögen werde.
2. Bei der Zubereitung von Haupt- oder Zwischenmahlzeiten probiere ich gerne neue Rezepte aus.
3. Es macht Spaß, Lebensmittel auszuprobieren, die ich nicht kenne.
4. Es interessiert mich sehr, was für Speisen die Menschen in anderen Ländern essen.
5. Ich esse gerne exotische Speisen.
6. Gerichte auf einer Speisekarte, die ich nicht kenne, machen mich neugierig.
7. Ich esse am liebsten Lebensmittelprodukte, die mir vertraut sind. (R)
8. Ich bin neugierig auf Lebensmittelprodukte, die mir nicht vertraut sind.

Note. English from van Trijp (1995, p. 139), German from Riepe (2003, p. 45).
(R) = Reversed item.

The VARSEEK-scale shows acceptable levels of internal consistency for two administrations of both the Dutch version (Cronbach's $\alpha = .89$ and .91, resp., van Trijp, 1995, p. 144) and the Finnish version ($\alpha = .86$ and .87, resp., Lähteenmäki & van Trijp, 1995; van Trijp, Lähteenmäki, & Tuorila, 1992); for the English version, consistency in the same sample on three different occasions ranged from $\alpha = .83$ to $\alpha = .88$ (Meiselman, Mastroianni, Buller, & Edwards, 1999). For the German translation, similar values in two different samples could be established (α = .86 and .87, resp., Riepe, 2003). Test-retest correlations for the English version ranged from r = .61 to r = .72 (intervals: 3 and 4 months; Meiselman, Mastroianni, Buller, & Edwards, 1999).

The Sensation Seeking Scale (e.g., Zuckerman, 1994) was constructed as a method for measuring behavioral correlates of striving for intensive, new, and varied experiences and of trying to avoid boredom in general (e.g., Schneider & Rheinberg, 1996) and as such was also used in the attempt to predict food-related behaviors from broad traits in the early years of research into food choice (e.g., Gniech, 2002, pp. 74-75; Logue, 2004, pp. 83-84; Schubert & Godersky, 1996, pp. 106-107; Zuckerman, 1994, pp. 252-257).

For example, Kish and Donnenwerth (1972) found that persons scoring high on the Sensation Seeking Scale tended to prefer more stimulating foods like spicy, sour, or crunchy items. This result was basically corroborated by Logue and Smith (1986), who, in their sample of New York State University students, were also able to establish positive correlations between sensation seeking and the liking for nonordinary American cuisine like Middle Eastern or Japanese food. Quite similarly, using a Japanese translation of the Sensation Seeking Scale, Terasaki and Imada (1988) found substantial correlations between sensation seeking and preferences for nonordinary Japanese cuisine like Middle Eastern, Mexican, or Korean food in their sample of Japanese students. Raudenbush, van der Klaauw, and Frank (1995) reported sensation seeking to be positively associated with the number of foods their respondents liked and negatively with the number of those they would not try. Otis (1984), however, generally failed to demonstrate significant relationships between sensation seeking and willingness to taste unusual food items, and, similar to other researchers (e.g., Ajzen, 2005a; Diehl, 1980, 1993; Pudel & Westenhöfer, 2003; see above), she came up with the conclusion "that food adventurousness is best accounted for by highly specific attitudes about food rather than general personality measures" (p. 739).

Food Neophobia

Complementary to sensory-specific satiety, which may trigger intrinsically motivated variety-seeking behavior (see above), food neophobia "is a conservative force, operating to keep the organism's feeding behavior 'locked in on a safe track' ... (Schulze and Watson, 1995, p. 230)" (Pliner & Salvy, 2006, p. 75; see also chap. 2.1); it thus contributes to "the observation that consumers do not exploit their freedom in [product] choice to its full extent" (van Trijp, 1995, p. 3).

At the trait level, food neophobia denotes "a relative preference for familiar over novel foods that is stable over time and consistent across situations" (Pliner & Salvy, 2006, p. 76) or a "reluctance to eat and/or avoidance of novel foods" (Pliner & Hobden, 1992, p. 105). At the level of observable behavior, it is predictive of the willingness to try foods that an individual is *unfamiliar* with, particularly those of a different ethnic or of animal origin; it is operationally defined as the average degree of willingness to taste a number of (novel) food items presented to a respondent in a laboratory setting (Cox & Anderson, 2004, pp. 158-159; Pliner & Salvy, 2006; see also Martins, Pelchat, & Pliner, 1997; Pliner & Pelchat, 1991; Potts & Wardle, 1998). While neophobic persons tend to rate familiar foods (e.g., salad dressings) with novel flavors significantly lower for hedonic attributes than neophilics, the rank order of the acceptability scores of the foods with different flavors is similar for both neophobic and neophilic persons (Henriques, King, & Meiselman, 2009).

Food neophobia has been demonstrated to be distinguishable from, though related to, finickiness or pickiness, which is the tendency to reject food items that an individual is *familiar* with (Pliner & Salvy, 2006, pp. 81-82; see also Dovey, Staples, Gibson, & Halford, 2008; Potts & Wardle, 1998; Raudenbush & Frank, 1999; Raudenbush, van der Klaauw, & Frank, 1995).

Liking for a novel food or willingness to try it can be increased when *indirect* information about the food is supplied; this kind of information may be descriptive, or promising a good taste experience, or praising beneficial consequences following the ingestion of that food (e.g., Martins, Pelchat, & Pliner, 1997; McFarlane & Pliner, 1997; Pelchat & Pliner, 1995; Pliner & Salvy, 2006, p. 77; Tuorila, Meiselman, Bell, Cardello, & Johnson, 1994; Tuorila, Meiselman, Cardello, & Lesher, 1998; cf. Tuorila, Andersson, Martikainen, & Salovaara, 1998).

As was already indicated above (see chap. 2.1), repeated exposure to (the flavor of) a novel food item is quite likely to result in increased likability of and preference for that item, provided that ingesting the food has not been followed by negative gastrointestinal consequences like those, for example, that lead to an acquired taste aversion. Being repeatedly exposed to a novel food may be considered as a way of providing *direct* nonverbal sensory information about the sight, smell, and taste of that food; a process that is equivalent to the mere exposure effect. With increasing number of exposures an individual learns that the novel food is safe, that is, it does not cause illness. Such positive experiences following the contact with novel foods may generalize to the willingness to taste other novel foods and may thus reduce food neophobia, although this reduction has been shown to be only temporarily effective in children (Birch, 1999, pp. 49-51; Ogden, 2003, pp. 28-29; Pliner & Salvy, 2006, pp. 77-78; Reverdy, Chesnel, Schlich, Köster, & Lange, 2008; see also Birch, McPhee, Shoba, Pirok, & Steinberg, 1987; Pliner, Pelchat, & Grabski, 1993; cf. chap. 2.1).

Social influence is another factor that may influence food neophobia in humans. It was found, for instance, that the willingness to accept a novel food can be increased in children when they watch their mothers, teachers, or their peers eating that food first; similar results were obtained from research with adults. Furthermore, the amount of novelty in the eating situation can have an impact on food neophobia: Children were found to be more likely to accept a novel food from their mothers than from an experimenter whom they were not acquainted with (Birch, 1999, pp. 51-53; Pliner & Salvy, 2006, pp. 78-80). Pliner and Salvy (2006, p. 80) hypothesize that one function of this principle is to facilitate the acceptance of a novel food; it was found, for example, that adding a familiar flavor to a novel food may increase a person's willingness to try it. This reasoning aligns reduction of food neophobia with the principle of flavor-flavor learning that was already described above (see chap. 2.1).

Food neophobia was found to be correlated (a) with the presumed trait of general neophobia, which is the preference for familiar situations and people or the unwillingness to experience new situations and people, respectively (Koivisto Hursti & Sjödén, 1997; Pliner & Hobden, 1992), and (b) with the willingness to engage in a wide variety of nonfood-related activities (Raudenbush, van der Klaauw, & Frank, 1995). Yet, these latter authors could not establish associations between food neophobia and the traits measured by the Eating Disorder Inventory EDI; also, they found no relationship between food neophobia and dietary restraint as measured by a revised version of Herman and Polivy's (1975) Restraint Scale. There are some indications that food neophobia, at both the trait and behavioral level, is positively related to both state and trait anxiety (e.g., Galloway, Lee, & Birch, 2003; Pliner & Hobden, 1992; Pliner & Salvy, 2006, p. 86), though other authors (e.g., Potts & Wardle, 1998; Raudenbush, van der Klaauw, & Frank, 1995) failed to corroborate these findings.

There is evidence for food neophobia to be negatively related to sensation seeking as measured by Zuckerman's (e.g., 1994) Sensation Seeking Scale (e.g., Pliner & Hobden, 1992; Raudenbush, van der Klaauw, & Frank, 1995; see also Pliner & Salvy, 2006, pp. 83-86) and to other measures based on the concept of an optimal stimulation level like the Change Seeker Index CSI (Bäckström, Pirttilä-Backman, & Tuorila, 2004, pp. 77-79) or, which is of particular relevance here, van Trijp's (e.g., 1995; see above) VARSEEK-scale (Meiselman, Mastroianni, Buller, & Edwards, 1999; cf. Nicklaus, Boggio, Chabanet, & Issanchou, 2005). This latter finding is fully in line with the idea of the omnivore's dilemma (see chap. 2.1): If the principles of sensory-specific satiety, which may trigger true variety-seeking behavior (see above), and food neophobia are theoretically linked to each other in an antagonistic way, a negative correlation between measures of both principles is plausible to emerge empirically.

Also, individuals scoring high on food neophobia were found to be more likely to be phenylthiocarbamide PTC tasters and to show lower pre-ingestive flow of saliva when expecting to ingest food as opposed to persons scoring low on this trait (Raudenbush, Corley, Flower, Kozlowski, & Meyer, 2003). These findings suggest that there may be systematic physiological differences between persons scoring high and low on food neophobia. Recently, variation in food neophobia has also been shown to have a substantive genetic basis (Knaapila et al., 2007).

While food neophobia, in combination with sensory-specific satiety, appears to have served an adaptive purpose for the human species during evolution (see chap. 2.1), Pliner and Salvy (2006, p. 87) reckon that this disposition may nowadays have outlived its usefulness, because in the mean time culture has taken over its protective function by preventing individuals from encountering dangerous items in their natural environments that look like edible substances although they are not. Today, food neophobia may even be maladaptive because there are indications that a reduced acceptance of novel foods may be associated with a decreased diversity of nutrient intake and a lower willingness to make dietary changes in a positive direction (Pliner & Salvy, 2006, pp. 86-87; Raudenbush & Frank, 1999, p. 261). It was found, for example, that food neophobia is negatively related to the consumption of vegetables and fruit (Cooke, Wardle, Gibson, Sapochnik, Sheiham, & Lawson, 2004; Galloway, Lee, & Birch, 2003), to the intake of vitamin E (Falciglia, Couch, Gribble, Pabst, & Frank, 2000), and to the range of food preferences as well as to healthful food preferences overall (Russell & Worsley, 2008).

There do not seem to exist many instruments to ascertain interindividual differences in the extent to which individuals are food neophobic: The apparently most often applied method is Pliner and Hobden's (1992) Food Neophobia Scale (FNS), a questionnaire consisting of 10 items, which were selected according to the principles of classical test theory (cf., e.g., Gulliksen, 1950; Lienert, 1989); a similar type of scale was derived by Raudenbush, van der Klaauw, and Frank (1995), but it did not receive much attention in the literature (for an exception see Potts & Wardle, 1998). Frank's research group (e.g., Raudenbush & Frank, 1999; Raudenbush, van der Klaauw, & Frank, 1995; see also Pliner & Salvy, 2006, pp. 80-81) also developed the Food Attitudes Survey FAS which is based on a list of familiar and novel foods each of which respondents have to evaluate in terms of whether they like, dislike, or won't try it, with the total number of each of these evaluations across all foods forming a variable; an approach that Potts and Wardle (1998) named the "list heuristic" (p. 79).

In addition, Pliner and her colleagues (Pliner & Salvy, 2006, p. 80) developed a questionnaire to assess the degree of neophobia in children.

Pliner and Salvy (2006) claim that the FNS, which was used in the present study, has been "extensively validated" (p. 81). It was demonstrated, for example, (a) that this scale is indeed able to predict willingness to try or choice of, respectively, novel foods (e.g., Martins, Pelchat, & Pliner, 1997; Pliner & Hobden, 1992; Raudenbush & Frank, 1999; Tuorila, Lähteenmäki, Pohjalainen, & Lotti, 2001; Tuorila, Meiselman, Bell, Cardello, & Johnson, 1994; but cf. Flight, Leppard, & Cox, 2003; Tuorila, Andersson, Martikainen, & Salovaara, 1998); (b) that the FNS is related to the serving of common and uncommon foods in the household (Koivisto & Sjödén, 1996; Koivisto Hursti & Sjödén, 1997); (c) that the scale is meaningfully related to physiological parameters, one of which, salivation, serves as an indicator of a person's cephalic phase response when he or she is preparing for the ingestion of food (Raudenbush, Corley, Flower, Kozlowski, & Meyer, 2003); and (d) that the FNS shows convergent validity with the above mentioned list heuristics (Raudenbush et al., 1998, cited in Pliner & Salvy, 2006, p. 81; Potts & Wardle, 1998, p. 86).

The original English version of the FNS was developed and applied in samples of Canadian students (Pliner & Hobden, 1992). Since then, it has been used in many populations worldwide, for example, in samples of U.S. nonstudent individuals (e.g., Ritchey, Frank, Hursti, & Tuorila, 2003; Tuorila, Meiselman, Bell, Cardello, & Johnson, 1994; Tuorila, Meiselman, Cardello, & Lesher, 1998), in student samples in Australia (Flight, Leppard, & Cox, 2003) and in the UK (Meiselman, Mastroianni, Buller, & Edwards, 1999), as well as among general consumers in New Zealand (Prescott, Young, O'Neill, Yau, & Stevens, 2002); these latter authors also had the questionnaire translated into Japanese and Chinese and administered it in Japan and Taiwan. The scale was used in a Finnish (e.g., Bäckström, Pirttilä-Backman, & Tuorila, 2004; Tuorila, Andersson, Martikainen, & Salovaara, 1998; Tuorila, Lähteenmäki, Pohjalainen, & Lotti, 2001), a Swedish (e.g., Koivisto & Sjödén, 1996; Koivisto Hursti & Sjödén, 1997), and a Dutch version (Schickenberg, van Assema, Brug, & de Vries, 2006); also, a basically successful attempt was made to investigate the cross-national comparability of test scores from different translations of the FNS by means of confirmatory factor analyses (Ritchey, Frank, Hursti, & Tuorila, 2003).

However, there does not seem to exist a German version of the FNS; hence, to apply the scale in this study, the original wordings of the 10 items were translated into German (see Table 2). In the present study (see Appendix B1, Question H38), the items were administered using a 7-point rating scale again that ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Thus, FNS scores could range from 10 to 70 points with higher scores indicating a higher degree of food neophobia.

Table 2

Item Wordings of the Food Neophobia Scale (FNS)

English

1. I am constantly sampling new and different foods. (R)
2. I don't trust new foods.
3. If I don't know what is in a food, I won't try it.
4. I like foods from different countries. (R)
5. Ethnic food looks too weird to eat.
6. At dinner parties, I will try a new food. (R)
7. I am afraid to eat things I have never had before.
8. I am very particular about the foods I will eat.
9. I will eat almost anything. (R)
10. I like to try new ethnic restaurants. (R)

German

1. Ich probiere ständig neue und verschiedenartige Speisen aus. (R)
2. Ich habe kein Vertrauen zu unbekannten Speisen.
3. Wenn ich nicht genau weiß, welche Zutaten in einer Speise sind, probiere ich sie nicht.
4. Ich mag Speisen aus anderen Ländern. (R)
5. Fremdländische Speisen sehen meist so seltsam aus, dass ich sie kaum essen mag.
6. Bei einer Einladung zum Abendessen probiere ich auch Gerichte aus, die mir nicht vertraut sind. (R)
7. Ich habe ein ungutes Gefühl, wenn ich Speisen esse, die ich zuvor noch nie probiert hatte.
8. Ich bin sehr wählerisch bei der Auswahl der Speisen, die ich esse.
9. Ich esse fast alles. (R)
10. Ich probiere gerne mal neue, ausländische Restaurants aus. (R)

Note. English from Pliner and Hobden (1992, p. 109), German from the present author.
(R) = Reversed item.

The FNS shows acceptable levels of internal consistency (a) for the English version (Cronbach's α = .88 in two Canadian samples, Pliner & Hobden, 1992; range across three different occasions in the UK from α = .81 to .85, Meiselman, Mastroianni, Buller, & Edwards, 1999; α = .89 in a U.S. sample, Tuorila, Meiselman, Bell, Cardello, & Johnson, 1994), (b) for the Swedish version (range across different groups of respondents from α = .81 to .90, Koivisto Hursti & Sjödén, 1997), and (c) for the Finnish version (α = .85, Tuorila, Lähteenmäki, Pohjalainen, & Lotti, 2001; cf. Tuorila, Andersson, Martikainen, & Salovaara, 1998). Test-retest correlations for the English version ranged in the Canadian samples from r = .82 to r = .91 (intervals: 2 to 15 weeks; Pliner & Hobden, 1992) and in the UK sample from r = .49 to r = .63 (intervals: 3 and 4 months; Meiselman, Mastroianni, Buller, & Edwards, 1999).

Other Dispositions

There were other nutrition-related scales and questionnaires developed to ascertain person-related determinants of eating behavior; however, most of them either appear to have been primarily meant to measure clinical aspects of nutrition behavior (for an overview see Diehl & Staufenbiel, 1994, pp. 1-6; also Diedrichsen, 1995b, pp. 49-51) or do not seem to have received very much attention in the literature (e.g., instruments suggested by Mehrabian, 1987; Roininen, Lähteenmäki, & Tuorila, 1999; or Steptoe, Pollard, & Wardle, 1995).

To overcome the apparent shortage of instruments particularly in the German-speaking area, Diehl and Staufenbiel (1994) compiled a collection of scales that were intended to cover the majority of those aspects of eating behavior and weight problems that were considered as relevant by nutritional psychology (p. 7). They named this instrument "Inventar zum Eßverhalten und Gewichtsproblemen" (IEG; "Eating Behavior and Weight Problems Inventory", p. 136). Though the IEG has not yet been extensively in use either (for an exception see, e.g., Lehrke, Hubel, & Laessle, 2005), its scale 1 "Attitude toward eating (Importance of eating)" (p. 136; "Einstellung zum Essen [Stellenwert des Essens]", p. 20; [IEG scale 1]) was administered in the present study. It consists of 10 items (for item wordings see Appendix B1, Question H38; the items appear on the questionnaire in alternating order with the items of the FNS).

Response format for this instrument was again a 7-point rating scale which ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Thus, IEG scale 1 scores could sum up to values from 10 to 70 points with higher scores indicating a more positive attitude towards eating, that is, eating is judged as being more significant for a person's well-being and zest for life. The scale was found to have a sufficient degree of internal consistency with Cronbach's $\alpha = .85$ (Diehl & Staufenbiel, 1994, p. 20).

At this point the question may arise as to why the IEG scale 1, which clearly refers to the concept of attitude in its scale title (English translation given by the scale authors themselves, Diehl & Staufenbiel, 1994, p. 136), and personality traits are mentioned here in the same breath, although it was already indicated above that both are similar though distinguishable notions. While the concept of attitude will be given more attention to when explicating models of food choice (see below), for the moment the explanation may suffice that all nutrition-specific scales mentioned in the present context appear to have been developed from a distinctly applied-psychological point of view (i.e., how much do they help to identify meaningful determinants of nutrition behavior) rather than from a puristically theoretical perspective (i.e., to what extent do they comply with basic concepts of academic psychology). Some of their items resemble those that are typically used to ascertain an attitude, others look like typical items from a personality inventory; or put in Meiselman, Mastroianni, Buller, and Edwards' (1999) words: "the distinction between attitude (with its evaluative component) and trait (with its dispositional component) seems to blur for these [FNS and VARSEEK-] scales" (p. 7).

Moods and Emotions

Although there is no general agreement on what exactly is a mood as opposed to an emotion, and what is not a mood, it can broadly be considered as "a transient episode of feeling or affect" (Watson & Clark, 1994, p. 90), "a psychological arousal state lasting at least several minutes and usually longer" (Gibson, 2006, p. 113), up to hours or even days (Ekman, 1994; Watson & Clark, 1994), or a "nonintentional affective state" (Frijda, 1994, p. 60), which provides the "background, the emotional color, to all that we do" (Davidson, 1994, p. 52) and which "may appear and persist in the absence of obvious stimuli" (Gibson, 2006, p. 114). Emotions, on the other hand, "can be defined as short-term affective responses to appraisals of particular stimuli, situations or events" (Gibson, 2006, p. 114; see also Watson & Clark, 1994, pp. 89-90) like, for example, "anxiety, anger, sadness, joy, and disgust" ("Angst, Ärger, Traurigkeit, Freude und Ekel", Macht, 2005a, p. 304). Both types of affect have been found to be potential antecedents and consequences of food intake (e.g., Gibson, 2006; Grunert, 1993; Macht, 2005a, b), though in empirical research the distinction between both is not always clear-cut (Gibson, 2006, p. 114).

As an *antecedent* to food intake, for instance, (a) negative emotions can impact eating behavior either in a stimulating or in an inhibiting way (for a literature overview see Macht, 2005b, p. 10), but to date there is no sound explanation of this variability available (Macht, 2005b, p. 9); (b) very intensive emotions like strong anxiety inhibit nutrition behavior, because they are associated with behaviors and physical reactions that are incompatible with food intake (Macht, 2005a); or (c) both positive and negative emotions are able to disinhibit dietary restraint so that persons scoring high on this dimension eat more when experiencing emotions than do those scoring lower (Macht, 2005a, b; see also Patel & Schlundt, 2001). The most common way in which food intake may result in a change in mood and arousal as a *consequence* of eating is the "general meal effect" (Gibson, 2006, p. 115) which typically makes an individual calm, lethargic, and even sleepy after a satiating meal has been ingested (Gibson, 2006, pp. 114-115; cf. Cox & Anderson, 2004, pp. 161-163).

In addition to the lack of agreement about a definition of mood, there is uncertainty among researchers about the number and nature of different mood facets. Various discrete dimensions have been defined, assumed, or empirically derived, for example, depression, anxiety, hostility, or joy (cf., e.g., Plutchik & Conte, 1989); however, a growing body of empirical evidence justifies the assumption of two broad factors that possibly underlie all various distinct mood dimensions: positive and negative affect, "the 'big two' of affect" (Watson & Clark, 1997, p. 269). Yet, the question of whether moods are best conceptualized and measured as uni- or bipolar dimensions seems to be debatable; polarity may depend on, among other things, (a) the type of rating scale used (e.g., continuously graphical vs. discrete scale points), (b) the number of scale points used, (c) the formulation of a scale's verbal anchors and its scale-point descriptors, if any, and particularly whether the latter are symmetrically arranged, (d) systematic response sets on the part of the respondents, or (e) whether within- or between-subject data are analyzed (for a discussion see, e.g., Riepe, 2001, pp. 48-52; Watson & Clark, 1997).

Despite the lack of a commonly accepted definition of mood and the uncertainty regarding its factor space, agreement seems to exist on the fact that moods are characterized by both between-subject differences in habitual levels (traits) and within-subject fluctuations over time (states); the latter need to be distinguished conceptually and empirically from error of measurement (see, e.g., Buse & Pawlik, 1991; Riepe, 2001; Watson & Clark, 1994, pp. 91-92). Researchers have used different strategies for assessing or deriving state and trait measures of mood; one way of arriving at a *trait* estimate is to measure a person's momentary mood (i.e., his or her current state) repeatedly on different occasions and to aggregate these scores (e.g., Eid, Schneider, & Schwenkmezger, 1999, p. 284; Zuckerman, 1983). This "resulting aggregate variable [can] be treated at a level of conceptual generality comparable to that of a trait" (Hedges, Jandorf, & Stone, 1985, p. 433), especially when reports were sampled in natural environments (cf. Epstein & O'Brien, 1985).

A person's momentary mood can reasonably be assessed at any given time during his or her waking hours because "waking consciousness is experienced as a continuous *stream of affect*, such that people are always experiencing some type of mood" (Watson & Clark, 1994, p. 90). A common way to assess moods is to obtain self-reports of subjective experience by means of a mood adjective check list MACL. The items of such a list consist of mood adjectives (e.g., "sad") or simple statements (e.g., "I feel sad."), and respondents are asked to rate the extent to which they experience each of these emotional qualities, be it at the moment of reporting, for a given time interval, or in general. A similar approach, which is also applied in research into food and mood, is to use rating scales (Gibson, 2006, p. 114), which can be anchored, for example, by presumed antonyms like *good* vs. *bad*. Self-reports like those mentioned here generally appear to be sufficiently reliable and valid instruments for measuring moods (Watson & Clark, 1997).

In the present study (see Appendix B2), two 7-point scales were administered for ascertaining global daily mood and global daily physical comfort; the scales ranged from 1 (*miserable*) to 7 (*excellent*). However, as mood and physical comfort are likely to fluctuate over time, global ratings of this kind will not provide much more than rough estimates of what a person has experienced throughout a day. Also, Hedges, Jandorf, and Stone (1985) found that *overall* daily mood ratings were numerically closer to the experienced *peak* mood of a day than to the arithmetic *mean* of repeated mood measurements over that day. Still this unpretentious approach to measuring mood was made here in order not to miss out on a basic piece of information on habitual emotional differences between individuals that might be associated with differences in nutrition behavior.

Socioeconomic Status (SES) and Demographic Characteristics

The SES denotes "a rating of the status of an individual's position in a stratified society based on a variety of social (e.g., family background, ..., education of parents, education of self, values, occupation, etc.) and economic (income of family, of self) indices" (Reber, 1995, p. 735). Demography is "the statistical study of human populations with regard to their size and structure, i.e. their compositions by sex, age, marital status and ethnic origin" (Jary & Jary, 2000, p. 147). Though from a psychological point of view, socioscientific characteristics like these appear to be quite distal sources of influence on a person's behavior, which are imagined to exert their power mediated by other, more psychological constructs such as attitudes (cf., e.g., Ajzen, 2005a, pp. 134-136; Conner, 1994; Conner & Armitage, 2002, p. 8), they have nonetheless been used to describe and predict nutrition behavior with great success (e.g., Weyrauch, 1996).

As was already pointed out several times throughout this text, there is overwhelming evidence for SES and demographic factors like age, sex, household size, or geographic region (e.g., former East vs. West Germany) to have substantial, even crucial impact on nutrition behavior and its outcomes (see above and chap. 1; see also, e.g., Axelson & Brinberg, 1989, pp. 87-102; Barker, Lawrence, Woadden, Crozier, & Skinner, 2008; DGE, 2004, pp. 25-41; Donkin et al., 1998; Georgiou et al., 1997; Martín, Nieto, Ruiz, & Jiménez, 2008; RKI, 2004) and on health state in general (e.g., Schwenkmezger, Eid, & Hank, 2000, pp. 146-148): For example, (a) nutrition knowledge, being itself associated with more health-sustaining food patterns, was found to be dependent on sex and SES; (b) obesity as a risk factor for severe chronic diseases was demonstrated to increase with increasing age and with decreasing SES and to be higher in more recently born cohorts; (c) the lower the SES, the more likely that a person will be affected by malnutrition, and the more likely that food will be used as a reward or punishment in the education of children; and (d) the lower the income, the bigger its relative share that needs to be spent for food (Engel's law).

But most importantly and regardless of its exact definition, poverty (definable, e.g., as "the lack of sufficient material and cultural resources to sustain a healthy existence", Jary & Jary, 2000, p. 480; for a discussion see, e.g., Hradil, 2001) has been identified as a major correlate if not determinant of unfavorable food habits (e.g., Barlösius, Feichtinger, & Köhler, 1995; DGE, 2004; Hauber-Schwenk & Schwenk, 2000; Köhler, Feichtinger, Barlösius, & Dowler, 1997). Poor people, both adults and children, in Germany and in other affluent Western societies are at disadvantages in all phases of the provisioning, preparation, and consumption of foods and consequently, in the intake of nutrients (e.g., Bradley & Corwyn, 2002; Giskes, Turrell, Patterson, & Newman, 2002; Hulshof, Löwik, Kistemaker, Ockhuizen, & Hermus, 1995; Hupkens, Knibbe, Drop, Diederiks, Stevens, & Lüschen, 1995; Kamensky, Feichtinger, & Zenz, 2000; Klocke, 1995; Köhler, 1995; Langnäse, Mast, & Müller, 1999, 2000; Prättälä, 1995; Turrell, Hewitt, Patterson, Oldenburg, & Gould, 2002). For instance, welfare recipients, as opposed to individuals who are not on welfare, tend to eat less wholegrain bread, dairy products, and fruit; their food choices are more dependent on the price, and they pay less attention to the quality and pollutant load of the foods they eat; the degree of saturation that can be achieved by eating a food is more important to them than the food's nutritive value (Kamensky, 1995; Kamensky, Feichtinger, & Zenz, 2000; Lehmkühler & Leonhäuser, 2000).

Several systematic differences in the frequency and volume of the consumption of alcoholic and nonalcoholic beverages have been established across different demographic and social-status categories; ingested volumes depend, among other things, on the region where a person lives, be it former East versus West Germany or a particular federal state (Bundesland), on his or her sex, age, or educational level (Axel Springer AG - Mediapilot, 2005; DGE, 2004, pp. 26-31; Diehl, 1996; Diehl, Bloh, & Swidersky, 1985; Diehl & Elmadfa, 1987; Mensink, Beitz, Burger, & Bisson, 2000, pp. 330-331). It was found, to give an example, that the share of persons drinking more than the tolerable upper alcohol intake level (i.e., for women more than 10 g, for men more than 20 g of alcohol per day on average; DGE, 2000a, pp. 66-67) is highest (a) among middle-aged persons (45 to 54 years) as opposed to other age groups, (b) in men living in the former East Germany versus men living in the former West Germany, and (c) for women living in big cities (> 100,000 inhabitants) as compared with those who live in smaller communities; moreover, the share of persons drinking more alcohol than the daily tolerable upper intake level tends to increase with increasing SES in both sexes (Burger & Mensink, 2004).

As for potable water, only little variation in terms of *volume* of water intake can be stated across the age groups (Diehl & Bloh, 1985; Mensink, Beitz, Burger, & Bisson, 2000, pp. 330-331). While Diehl and Bloh (1985, p. 170) in their older meta-analysis were uncertain as to whether there exist any sex differences in consumption quantities at all, more recent data suggest that women drink more water than men (Beitz, Mensink, Henschel, Fischer, & Erbersdobler, 2004, p. 50; Mensink, Beitz, Burger, & Bisson, 2000, pp. 330-331). The *frequency* of (mineral) water consumption, however, increases slightly with increasing age, and it is higher among persons living in the former West Germany compared to those living in the former East and higher in women than in men; the share of persons who drink mineral water was found to increase with increasing level of education, but only in men (Axel Springer AG - Mediapilot, 2005; Diehl & Bloh, 1985; Diehl & Elmadfa, 1987; Wüstefeld-Würfel, 1999, pp. 126-129).

It should be noted that all age-related results reported in the present context were obtained from cross-sectionally designed studies and thus do not allow for a differentiation between age and cohort effects.

Among students, who were the target group of the present piece of research, women appear to drink mineral (plus table) water slightly more frequently than men, while only a small minority of students do not drink any mineral or table water at all (see Figure 1).

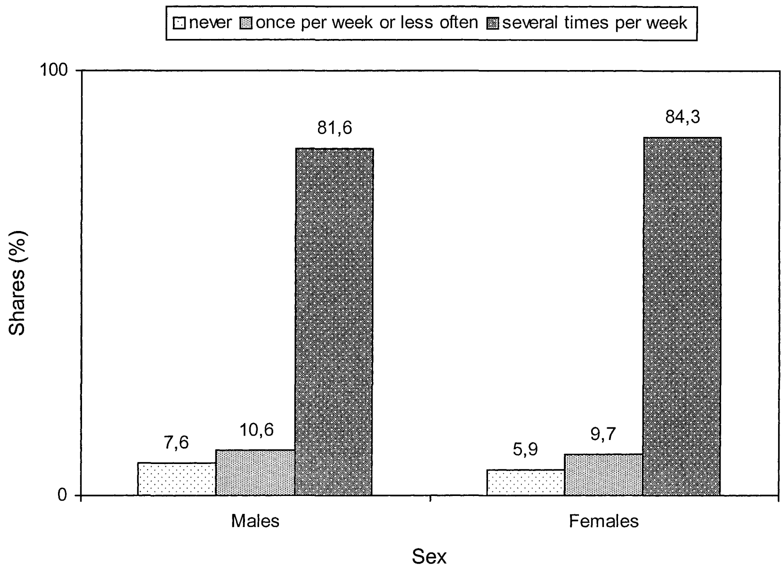

Figure 1. Frequency of claimed mineral plus table water consumption among German students aged 20 to 39 years. $N = 733$. Source: Verbraucheranalyse (Axel Springer AG - Mediapilot). Aggregated by the present author.
Note. These shares are based on an older version of the underlying data base (Verbraucheranalyse VA 2003/2) because this is closest to the period when the data of the present study were sampled (i.e., in 2002).

Whilst there do not appear to be too many problems related to ascertaining a respondent's age or sex or the size of his or her community, determining the SES is not that unambiguously achievable since this is a multidimensional construct (cf., e.g., Hradil, 2001). To harmonize the collection and aggregation of corresponding data in the fields of epidemiology and adjacent disciplines, recommendations have been issued to guide researchers (RKI, 2004). Three dimensions have been found to be the most important when establishing an individual's SES: income, level of education, and occupational status (e.g., RKI, 2004, chap. 2.2; Schwenkmezger, Eid, & Hank, 2000, p. 131). There are at least two basic approaches to its empirical determination: (a) the objective method which gathers information on the three dimensions and afterwards aggregates it into a single status score and (b) the subjective method which asks respondents to assess their SES themselves. Even though all three status dimensions are obviously interrelated, they do not fully overlap each other (Schwenkmezger, Eid, & Hank, 2000); furthermore, whether any one of them alone or in combination with the others is a better predictor of the consumption of a particular type of beverage, may depend strongly on the food item under consideration (Schaninger, 1981).

The empirical part of the present study was carried out among students, who will exhibit less variability in their SES compared to the general population due to similarities in their living conditions that will have a uniformizing effect on income and occupational status; and there should not exist much variability in their educational level either. However, the SES of their families of origin where the students were brought up, which is supposed to be an indicator of many sources of parental influence on the psychological endowment of an offspring and which should therefore partly determine his or her food patterns too (cf. chap. 2.1), should evidence enough variability to predict some of the differences between food consumption habits in students. In the first phase of their adult lives, when students live independently of their families of origin and form their own household, they may not yet have been exposed to other factors that frame and alter existing food patterns to a degree that will make their original families' influence completely unverifiable. One of these other factors may be, for instance, the food habits of persons living together with a student in the same household, because in the long run, diverging food patterns of individuals dwelling in the same household tend to mutually assimilate.

In the present study, several questions were asked to ascertain details of the respondents' families of origin (see Appendix B3, Questions N34 to N40), among which the subjective assessment of their parents' SES appears to be the most promising (Question N39). This 7-point scale ranged from 1 (*lower class* [*Unterschicht*]) to 7 (*upper class* [*Oberschicht*]). Also, respondents were asked to indicate their personal net income (Question N41) on a 9-point rating scale ranging from 1 (*less than 250 euros*) to 9 (*more than 2,000 euros*).

Physical Activity

"Physical activity is a complex multidimensional form of human behavior, or rather, a class of behaviors, that .... has biological consequences. Usually, physical activity refers to the movement of large muscle groups, such as when moving the arms and legs. Physical activity is generally defined as any bodily movement produced by skeletal muscles that results in energy expenditure" (Sjöström, Ekelund, & Yngve, 2004, p. 85). Physical *exercise* is a subset of physical activity that is performed with the purpose of improving or maintaining physical and mental fitness or health. Sjöström and his colleagues (Sjöström, Ekelund, & Yngve, 2004, pp. 85-88) distinguish between four domains in which physical activity takes place in daily life: (a) occupation (e.g., light office work, carpentry), (b) home and garden (e.g., lying while watching tv, snow shoveling), (c) transportation (e.g., riding on a train, bicycling), and (d) sport, with its competitive character, and leisure (e.g., table tennis, running).

According to a more global concept that ascribes a health-enhancing potential to a wide array of physical activities in an accumulating sense, other authors (e.g., RKI, 2005b, p. 7), however, classify physical activities into merely two broad categories: (a) leisure time and recreational activities including sport and (b) occupational activities and those related to household chores and transportation. This concept has recently attracted more and more attention. Meanwhile, since there is no doubt as to the positive impact of general physical activity on several aspects of physical and mental health, behaviors from both of these categories are accepted as equivalent in terms of maintaining health or preventing diseases. Physical activities, for example, (a) reduce the risk of coming down with cardiovascular diseases, noninsulin-dependent diabetes mellitus, colorectal carcinoma, and other severe ailments; (b) reduce the risk of becoming overweight or obese; and (c) increase life expectancy and the quality of life in general (Fuchs, 2005; RKI, 2005b, 2006; Sjöström, Ekelund, & Yngve, 2004).

While the performance of different activities involves different amounts of *average* energy expenditure (measured in, e.g., metabolic energy turnover with a basic unit corresponding to the energy expenditure during rest), each of these activities can be performed with *individually* varying degrees of intensity. An increase in metabolic energy turnover due to physical activity will lead to an increase in body temperature, which the body is able to tolerate only within a very small range, unless sweat is evaporated from the skin and water is exhaled from the lungs in order to counteract a potentially lethal rise in temperature. Depending on, among other things, the amount of energy expenditure and the weather conditions of the surrounding (see below), the resulting loss of body water can add up to several liters per day, which need to be replenished in addition to the 2 to 2.5 L that are lost during resting energy expenditure anyway (e.g., Henrichsmeier & Grothe, 1997; IDM, 2005a; Sjöström, Ekelund, & Yngve, 2004; cf. chap. 1.3).

Thus, regardless of the psychological determinants that may drive physical activity, the extent to which it is actually carried out will affect the maintenance of an individual's water balance and may thus ultimately influence his or her choice of beverages. The more body water is lost due to physical activity, the more water needs to be ingested through beverages, which may result in qualitatively or quantitatively differently composed relevant sets of consumed beverages. That is, individuals who lose more water due to physical activity may drink other beverages than persons who follow a more sedentary life-style, or they may drink the same beverages but with different volumes or proportions. And indeed, it is not only recommended to replace water losses with particular beverages (like potable water, unsugared herbal teas, or mixtures of water and fruit juice) rather than with others (e.g., alcoholic, caffeinic, or sweetened beverages; cf. chap. 1.3), but there are indications that with increasing level of sport activity, in Germany, the volumes of potable water and fruit or vegetable juice that are ingested do in fact increase while the volume of coffee decreases (Beitz, Mensink, Henschel, Fischer, & Erbersdobler, 2004, p. 50). On the other hand, during exercise, the consumption of flavored and sweetened beverages was experimentally demonstrated to result in increased total fluid intake in comparison to the consumption of mineral water (Passe, Horn, & Murray, 2000).

According to Sjöström and his colleagues (Sjöström, Ekelund, & Yngve, 2004; see also Oltersdorf, 1995b), physical activity can be measured either by objective or by subjective assessment methods. Objective methods like minute-by-minute heart-rate monitoring, which measures an individual's physiological response to activity, or motion sensors such as the accelerometer, which directly measures physical activity in terms of the acceleration or deceleration of the body in one or more directions, are based on technical devices and do not require behavioral reports by a person. Subjective methods like a diary or questionnaire appear to be the only choice in large-scale surveys, however, but they need to rely on the ability and willingness of respondents or interviewers to recollect or report behavior accurately by means of language.

In the present study (see Appendix B2), respondents were asked to record the total time per day that they were engaged in (a) physical work or labor like occupational activities or activities related to the household or garden and (b) physical exercise (in German: "Sport") including the time they may have spent in a sauna. Respondents were instructed to record times of strenuous transportation (like walking, bicycling), if any, either as labor or as physical exercise according to their preferred point of view. No information was obtained on the intensity with which these activities were carried out, though. Again, this approach to measure physical activity may not be the most sophisticated one, but it is an attempt to get hold of basic information on an important behavioral domain as a potential predictor of beverage consumption.

Situation-Related Determinants of Nutrition Behavior

The Eating and Drinking Environment

As was already explicated above, there does not exist any generally accepted taxonomy of situations that would allow for a standardized terminology to be used in research into the context of food intake (Meiselman, 2006; see also Buse & Pawlik, 1996; Pawlik & Buse, 1996; Schwenkmezger, Eid, & Hank, 2000; but cf. Bisogni et al., 2007). Instead, a multitude of potential, but ostensibly somewhat unrelated, determinants of food choice have been the target of various research activities, and the vast majority of these factors like, for instance, food packaging, plate shapes, menus, illumination, or cost have been found to have at least some verifiable influence on food acceptability or consumption (Bell & Meiselman, 1995, pp. 299-305; Meiselman, 2006; Wansink, 2004; also see above).

Meiselman (2006; see also King, Meiselman, Hottenstein, Work, & Cronk, 2007) distinguished between four broad categories of contextual variables that may be of relevance to food choice: (a) whether or not individuals have a choice between food alternatives, which is often a characteristic difference between laboratory and naturalistic settings; (b) the immediate physical environment (i.e., the spatiotemporal address); (c) the meal context (i.e., the unit of food which is under consideration, e.g., a bite of a food item, a dish, a meal, or a whole food pattern); and (d) the social context since the meal is essentially a social institution (cf. chap. 1).

It was demonstrated, for example, that testing identically prepared foods in different settings involving different degrees of individual choice (e.g., laboratory, chain restaurant, four-star restaurant, residential home for the elderly, student cafeteria) significantly changed the *level* of acceptability ratings but seemed to leave the *rank order* of these ratings across different products unaffected (Edwards, Meiselman, Edwards, & Lesher, 2003; King, Meiselman, Hottenstein, Work, & Cronk, 2007; Meiselman, Johnson, Reeve, & Crouch, 2000; see also Petit & Sieffermann, 2007); also, when simultaneously offering Italian and British food items in a British restaurant under usual (i.e., British) conditions as the control period versus an experimental period when the same restaurant was redecorated to make it look Italian-like, this manipulation not only increased the *perceived Italian* ethnicity of *British* menu items but also increased the *actual selection* of pasta and dessert items (Bell, Meiselman, Pierson, & Reeve, 1994).

Other authors reported on (a) a decrease in consumption of food items including water when the effort to obtain them was increased (Engell, Kramer, Malafi, Salomon, & Lesher, 1996; Meiselman, 2006; Meiselman, Hedderley, Staddon, Pierson, & Symonds, 1994); (b) an increase in food and beverage consumption when subjects were listening to music (McCarron & Tierney, 1989; Stroebele & de Castro, 2006); (c) a shift in acceptability ratings for particular food items according to their perceived appropriateness for a given meal type (e.g., breakfast), time of day (e.g., in the morning), occasion (e.g., birthday), location where it was served (e.g., kitchen), and the like (Bell & Meiselman, 1995, pp. 301-302; Birch, Billman, & Richards, 1984; Diehl, 1993, p. 78; Meiselman, 2006); and (d) an increase in the volume of ingested foods and beverages with prolonged meal duration, which appears to be a function of, among other sources of influence, the number of persons participating in a meal (Berry, Beatty, & Klesges, 1985; Clendenen, Herman, & Polivy, 1994; De Castro, Brewer, Elmore, & Orozco, 1990; Edelman, Engell, Bronstein, & Hirsch, 1986; King, Meiselman, Hottenstein, Work, & Cronk, 2007; Meiselman, 2006, pp. 187-188; Patel & Schlundt, 2001; Pliner, Bell, Hirsch, & Kinchla, 2006; Sommer & Steele, 1997; Stroebele & de Castro, 2006); and this number, in turn, seems to have a significant genetic basis (De Castro, 1995b).

In order to cover all relevant situation-related sources of influence on an individual's everyday beverage consumption behavior, the present study was conducted in the natural environments of the participants, who, while living freely in their habitats and retaining their daily routines, monitored and recorded their drinking behavior for 7 consecutive days. Given sufficient ecological validity and representativeness of these data (cf. Buse & Pawlik, 1990; Pawlik, 1978), this technique should ensure that all important situational factors that can potentially determine a person's beverage intake are actually taken into account to a degree which is equivalent to the influence they typically exert in that person's daily life (for details of the research methodology see chap. 3 and 5). While advocating such an approach in the field of food research, Meiselman (2006, pp. 189-190; see also Tomiyama, Mann, & Comer, 2009) complains that too few researchers have as yet dared to tackle this kind of endeavor.

Despite this attempt to take into account all situational factors that might be relevant to beverage consumption, three potential sources of environmental influence were recorded during the data collection period in order to demonstrate their effect separately: (a) the mutual social influence between a participant and other persons, if any, living together with him or her in the same household; (b) the weather; and (c) the relative share of total time a participant spent at his or her home or out of it, respectively.

Food habits and beliefs concerning mineral water intake were obtained from both the participants of the study and the persons, if any, living together with them in the same household in order to try and establish any interrelations between both groups of persons in terms of these dimensions and, thus, to pin down potentially existing mutual social influences on food choice (see Appendix B4, Questions M1 to M19).

The weather (i.e., the state of the atmosphere at a given spatiotemporal address), and specifically the air temperature, is a further aspect of the environment that should be carefully considered when investigating day-to-day beverage consumption in naturalistic settings, particularly if not all respondents recorded their behavior exactly during the same period. Similar to physical activity (see above), an increase in the temperature of the proximal air surrounding a person may increase body temperature and can thus trigger sweat production, resulting in an increased loss of body water, which needs to be additionally replenished (e.g., IDM, 2003, 2005a; Stahl & Heseker, 2006; "Trinken im Sommer", 1999; cf. chap. 1.3). And similar to the effect that the loss of body water due to physical activity can have on a person's relevant set of beverages (see above), it has been concluded from existing surveys, though it does not seem to have been an objective specifically addressed in any paper that was empirically targeting individual behavior at the microlevel, that in hot weather conditions (i.e., temperatures > 25 °C) the volume of total fluid intake, in general, and, particularly, that of potable water are increased (Bundesverband der Deutschen Erfrischungsgetränke-Industrie, 1998; Henrichsmeier & Grothe, 1997).

In psychology, the impact of the weather was investigated, for example, (a) in relation to mood and aggressive behavior, and in the context of mental or motor performance as well as vigilance (Schwenkmezger, Eid, & Hank, 2000, pp. 157-161; see also, e.g., Keller et al., 2005; Pawlik & Buse 1994); (b) in clinical psychology (e.g., Lee, Tsai, & Lin, 2007); (c) in aviation (e.g., Hunter, Martinussen, & Wiggins, 2003; Madhavan & Lacson, 2006); (d) as a predictor of a dining party's restaurant tipping (e.g., Rind & Strohmetz, 2001); (e) as a determinant of global differences in food consumption behaviors across cultures (Parker & Tavassoli, 2000); or (f) as a covariate of liking and consumption of iced-coffee (Petit & Sieffermann, 2007). When analyzing longitudinally collected psychological data (e.g., from repeated performance testings or mood measurements in naturalistic settings) in relation to concurrently obtained weather information, it is vital to take into account any autoregressive or cyclic structures in the data to avoid falling into the trap of spurious correlations between both domains (e.g., Pawlik & Buse 1994).

In this study, weather information was obtained throughout the data collection period on a daily basis from the weather station at Hamburg Airport (available from http://www.wetteronline.de) and was matched with the beverage diary data of participants reporting on the same day. This is, of course, only an approximation to the microclimatic conditions individuals were actually exposed to when reporting their beverage intake, which, if an individual stayed, for example, indoors at his or her home the whole day over, may have differed substantially from the outdoor measurements made on the airfield.

Furthermore, there are systematic differences between settings where individuals are at their homes, be it indoors or outdoors in the garden, and out-of-home settings in terms of, for example, availability of beverages, effort to obtain them, social context, or the behavior centrally performed in the setting (e.g., driving a car or sitting in a bar vs. watching tv or entertaining friends in the domestic sitting room; cf. Wüstefeld-Würfel, 1999). It was found that water intake in a Canadian sample was much higher when respondents were at their homes than when they were out of them (Levallois, Guévin, Gingras, Lévesque, Weber, & Letarte, 1998). Therefore, it seems promising to check to what extent this difference contributes to variations in the consumption of beverages. While they were monitoring and recording their beverage intake in the present study, respondents concurrently supplied information on whether they were staying at their homes or out of them for every quarter of an hour across the whole data collection period (see Appendix B2).

The Foods

It should have become clear from this text so far that the foods, being themselves part of the environment, interact in a complex manner with person-related predispositions, expectations, preferences, traits, attitudes, socioeconomic characteristics and so forth and with other situation-related parameters, while they are on their way through the multi-stage choice process from the shops to the mouth. And while the sensory characteristics of a food item partly determine its flavor and hence its hedonic appeal or its palatability, respectively, these latter aspects are often found to be only one of a multitude of predictors of food choice "and in some cases [they are] clearly well down the priority list" (Raats, Daillant-Spinnler, Deliza, & MacFie, 1995, p. 239).

Another important determinant of food choice is the specific context of other food items within which a consumer finds a product before he or she selects it. Before a food item is finally picked from a given assortment of other foods that are potential substitutes for the chosen variant, all of these compete with each other for being selected by the consumer and thus mutually influence their choice probabilities. And this influence, which all the other available, but eventually nonchosen, products exert, can be very different when the target product is presented as part of an altered set of available products. For example, the likelihood for a particular brand of mineral water to be picked from the shelf may be much higher in a shop where no other brands of mineral water are on offer, but, for instance, beers, juices, and sodas, as opposed to a supermarket where, alongside beers, juices, and sodas, a variety of other mineral water brands are obtainable too.

Furthermore, the availability of other foods can affect the total amount of intake. As was already pointed out when discussing the issue of sensory-specific satiety (see chap. 2.1), having a (wider) variety of foods or beverages with different flavors available can increase the volume which is totally ingested; this was found experimentally, for example, for ice cream (Berry, Beatty, & Klesges, 1985) and, under naturalistic conditions, for beverages (Bundesverband der Deutschen Erfrischungsgetränke-Industrie, 1998; Henrichsmeier & Grothe, 1997; see also Birbaumer & Schmidt, 2006, p. 647).

The data collection approach chosen for this study (see above and chap. 3 and 5) is supposed to ensure that the samples of foods and beverages that participants encounter, while they monitor and record their drinking behavior over a week, be it in the shops, in gastronomy, in their own households or workplaces, and the like, is representative of the population of all combinations of foods and beverages which they face in everyday life.

Nutrition Behavior: A Potential Outcome Measure

The present study is about person-related and, to a minor degree, about situation-related determinants of mineral water intake. Here, the ingestion of mineral water serves as the dependent variable or the outcome measure. Mineral water intake is a special case of the behavioral element of Funder's "personality triad" (2001, p. 210), beside the person and the situation, and it calls for some specification, since Funder's (2001) complaint about the imbalance of the triad ("if little is known about situations, even less is known about behaviors", p. 211) seems to hold fully true for the domain of nutrition behavior too.

While very many papers and book chapters examine person-related aspects of nutrition behavior and several others still deal with situation-related aspects of food choice and intake or with the foods themselves, hardly any publication explicitly addresses nutrition behavior as something that might need some kind of theoretical systematization, which, if successful, ought to allow a person, for example, to answer Funder's (2001) question to his readers: "How many [nutrition] behaviors have you performed so far today?" (p. 212). Practically all authors exactly point out in their method sections how nutrition behavior was measured in their particular study, and some authors take great pains to compile comprehensive overviews of the various ways of ascertaining food intake (e.g., Oltersdorf, 1995b; Patterson & Pietinen, 2004; Sichert, Oltersdorf, Winzen, & Leitzmann, 1984), but altogether these sources do not provide more than a barely structured, descriptive basis upon which nutrition behaviors might eventually be organized into psychologically meaningful categories.

As an exception, for example, Axelson and Brinberg (1989) recognized that "the foundation for understanding food-related behavior and its determinants rests on the definition and measurement of behavior" (p.5). They discerned four relevant, consecutive "stages from shelf to stomach" (Marshall, 1995b, p. 12): choice, purchase, consumption, and nutrient intake. Choice, according to Axelson and Brinberg (1989), reflects an individual's decision or intention to buy or consume a food; purchase is the acquisition of food by an exchange of money at the point of sale; consumption is the actual intake of food; nutrient intake differs from consumption in that the latter is a behavior, while the former is an outcome of this behavior, which is often used as a proxy for nutritional status and as an indicator of potential health risks a person is exposed to (pp. 6-10). Food intake can be ascertained merely *qualitatively* in terms of what is ingested, or in addition, *quantitatively* in terms of the volume of the ingested food items (cf., e.g., Sichert, Oltersdorf, Winzen, & Leitzmann, 1984).

But outcome measures used in research into human nutrition behavior are not confined to overt consumption or intake behavior, they encompass its consequences like nutrient supply, malnutrition, body weight, or nutrition-related diseases and also some of its proximal determinants like preference, likability, or acceptance. Yet, at least in some studies, these latter dimensions may be suspected to have been substituted for measures of actual food intake simply because of economic advantages of their measurement (Cox & Anderson, 2004, p. 153; cf. Pawlik & Buse's, 1982, p. 102, evaluation of contemporary psychology as a "behavioral science without behavior" ["Verhaltenswissenschaft ohne Verhalten"]).

Liking is the hedonic response to a food, but it is not the same as preferring it: While a piece of chocolate may have a much higher hedonic appeal than a carrot, a person may still prefer the latter to the former for some cognitive, health-related reasons. Preference, in addition, refers to the comparison between two or more foods, and to take effect, it requires the actual availability of an assortment of equally accessible foods to pick from. Furthermore, the likability for a food item is not intraindividually invariant, but it may change, for example, between different consumption contexts (Cox & Anderson, 2004, pp. 152-153; Diehl, 1993, pp. 77-78; Logue, 1995, p. 124; Rozin, 2006, pp. 24-25; see also above). Axelson and Brinberg (1989, p. 69) further differentiate between *preference* as a "response ... to food names" and *acceptance* as a "response ... to actual food items". In terms of causality, "liking is a major determinant of preference, and preference is a major determinant of intake, but many other variables intervene" (Rozin, 2006, p. 24).

The target behavior in the present study is the actual *intake* of pure, unprocessed mineral water *as a drink*, coming straight from the packaging where it was bottled in, not the *acquisition* of mineral water or any short- or long-term *consequences* of its consumption. In order for the respondents to record their behavior, they kept a beverage diary for 7 consecutive days which covered their entire beverage intake during this period, qualitatively and quantitatively, as precisely as possible. Types of ingested beverages and their summated volumes (in ml) were recorded separately for each of six intervals per day as promptly as possible. As the objective of this study is a psychological one, being related to the *act of drinking*, and not a nutrition-scientific or physiological one related to the idea of, for example, *fluid* or *nutrient supply*, the present approach does not take into account any usage of mineral water or other beverages for nondrinking purposes like preparing and *eating* soup (see Appendix B2 and chap. 5).

2.3 Models of Food Choice

Animal and Human Models

Potential determinants of mineral water intake that have been addressed so far in this text can be split into two broad categories: Either (a) they are part of an itemized collection of mutually unconnected, narrow-bandwidth factors from both the person and situation sides of the personality triad, some of which, like SES or psychobiological determinants, even appear to be quite distal sources of influence whose impact on nutrition behavior needs to be imagined to be mediated by other, more psychological characteristics; or (b) they are part of comprehensive, exhaustive, and very complex accumulations of potential factors, spanning nearly all the various academic disciplines that research into nutrition behavior, arranged in a model-like fashion but with only vaguely specified interrelations and causal directions of influence (cf., e.g., Bayer, Kutsch, & Ohly, 1999, pp. 98-99; Conner & Armitage, 2002, p. 6; Shepherd, 1999, p. 808; Sichert, Oltersdorf, Winzen, & Leitzmann, 1984, p. 9). The explanatory power of the former may not be expected to be too strong, while the latter approaches will be extremely hard to operationalize and to apply when investigating day-to-day beverage consumption in naturalistic settings.

Midway between these paradigmata, medium-sized conceptual frameworks of moderate complexity originating from social psychology have been used for predicting, explaining, and modifying nutrition-related behaviors and outcomes (cf., e.g., Axelson & Brinberg, 1989; Baranowski, Cullen, & Baranowski, 1999; Conner & Armitage, 2002; Klotter, 2007; Shepherd & Raats, 2006). These frameworks are theoretically grounded models, hypothesizing a number of predictors with specified interrelations or causal influences on each other and finally on a dependent outcome variable. Many of them have also been applied in other areas of health psychology like, for example, sport and exercise psychology, road safety, smoking cessation, safer-sex behaviors, or participation in preventive health screening programs (e.g., Fuchs, 2005; Rutter & Quine, 2002a; Scholz & Schwarzer, 2005; Stroebe & Jonas, 2001).

Social psychology is the "investigation of how the thoughts, feelings and behaviors of individuals are influenced by the actual, imagined or implied presence of others" (Allport, 1935, cited in Conner & Armitage, 2002, p. 1); and "the *social psychology of food* is the application of the principles of social psychology to the understanding of food-related behaviours" (Conner & Armitage, 2002, p. 2), since these behaviors, as should have become clear from the present text so far, are essentially embedded in social contexts. The social psychology of food "is interested in how our interaction with others and our social environment can influence what foods we eat and the amounts we eat" (p. 2).

Conner and Armitage (2002) lay particular stress on the role of social cognitions within the field of social psychology because this "approach focuses on individual cognitions or thoughts as processes that intervene between observable stimuli and responses" (p. 2) as when perceiving a food and choosing to ingest it; or put in other words, the approach takes into account that and "how individuals make sense of social situations" (p. 2). Furthermore, these authors (Conner & Armitage, 2002, 2006; see also Ajzen, 2005a) point out that the intervening processes are more proximal determinants of food choice which, on the one hand, are likely to mediate the impact of more distal sources of influence on nutrition behavior like, for example, physiological mechanisms or SES attributes ("background factors", Ajzen, 2005a, p. 134), while, on the other hand, they "can often be manipulated, offering a useful way to intervene to change behaviour that has become dysfunctional or harmful to the individual" (Conner & Armitage, 2002, p. 10).

Sociopsychological modeling of food choice is rooted in animal research on learning theory. It has been established, for example, that individuals of many species including humans try to maximize their success in obtaining food. According to Herrnstein's matching law, they will tend, on average, to search for food in places where the probability to find food is higher than in other places; that is, they will tend to match the distribution of their choices of places to the learned probabilities of receiving food as a reward in these places. Another approach, optimal foraging theory, states that humans and nonhuman animals, while roving in search for food, will try to maximize the ratio of gained food energy or benefit to the expended energy, effort, or cost. Though both theories have been successfully applied to human nutrition behavior, they are not able to account for more than just a small number of potential determinants of human food choice. They are also based on a misleading kind of cost-benefit analysis: They model *actual* costs and benefits while genuinely sociopsychological models, in contrast, take the *perceived* costs and benefits into account (Conner & Armitage, 2002, pp. 22-24; Logue, 2004, pp. 115-126). Moreover, both theories seem to be most suitable for modeling nutrition behavior that follows the search-and-find strategy. The dominant aspect of contemporary nutrition behavior in affluent societies is, however, to make decisions between food products that are abundantly available "in arm-length" (Oltersdorf, 2002, p. 180; cf. chap. 1).

According to Sobal, Bisogni, Devine, and Jastran (2006, p. 1), three classes of approaches to develop or to derive models of *human* food choice can be distinguished: (a) the application of theories or models to nutrition behavior which had originally been developed to explain behavior in other domains (cf., e.g., Axelson and Brinberg, 1989; Baranowski, Cullen, & Baranowski, 1999; Conner & Armitage, 2002; Klotter, 2007), (b) the development of theories or models unique to the domain of nutrition behavior (cf., e.g., Pudel & Westenhöfer, 2003; see also DGE, 1988), and (c) models of food choice which were "developed using qualitative research methods to produce emergent conceptualizations of how people think about and engage in food choices" (Sobal, Bisogni, Devine, & Jastran, 2006, p. 1; cf., e.g., Furst, Connors, Bisogni, Sobal, & Falk, 1996; Sobal, Bisogni, Devine, & Jastran, 2006).

Another, perhaps more prevalent, classification system of the sociopsychological models applied in health psychology including nutrition behavior and physical activity separates *stage* models from *continuum* models. Stage models "assume that health behaviour change involves progression through a discernible number of stages, from ignorance of a health threat to completed preventive action" (Stroebe & Jonas, 2001, p. 529); they "predict that the movement of an individual from one stage to the next will be influenced by a given set of factors, but that movement between other stages will be influenced by different factors" (Shepherd, 2006, p. 345). Examples of stage models are (a) Weinstein's precaution adoption process model, (b) Schwarzer's health action process approach, or (c) the transtheoretical model. Continuum models take "perceptions or beliefs, and [try] to predict from their combined effect where the individual will lie on an outcome continuum such as intention or behaviour.... The purpose of an intervention would be to change those perceptions or beliefs in an attempt to move the person up or down the outcome continuum" (Rutter & Quine, 2002b, pp. 15-16). Though individuals score differently on the predictor variables, "it is generally assumed that the rules governing the combination of variables will be the same for all individuals" (Shepherd, 2006, p. 345). Examples of continuum models are the health belief model or the protection motivation theory (Fuchs, 2005; Rutter & Quine, 2002b; Scholz & Schwarzer, 2005; Shepherd, 2006; Stroebe & Jonas, 2001).

One of the most prominent continuum models, however, is the theory of planned behavior ([TPB]; e.g., Ajzen, 1991, 2005a; see also 2007), which was expanded from the theory of reasoned action ([TRA]; e.g., Ajzen & Fishbein, 1980). Both approaches have been applied in many behavioral domains including (a) *nutrition behavior* (e.g., Armitage & Conner, 1999a, b, 2002; Arvola et al., 2008; Arvola, Lähteenmäki, & Tuorila, 1999; Axelson & Brinberg, 1989; Baranowski, Cullen, & Baranowski, 1999; Berg, Jonsson, & Conner, 2000; Blanchard et al., 2009; Bogers, Brug, van Assema, & Dagnelie, 2004; Brug, de Vet, de Nooijer, & Verplanken, 2006; Caprara, Barbaranelli, & Guido, 1998; Collins & Carey, 2007; Conner, 1993; Conner & Armitage, 2002, 2006; Conner, Sheeran, Norman, & Armitage, 2000; Conner, Warren, Close, & Sparks, 1999; de Bruijn, Kremers, de Vries, van Mechelen, & Brug, 2007; de Bruijn, Kroeze, Oenema, & Brug, 2008; Di Natale & Saba, 1997; Fife-Schaw, Sheeran, & Norman, 2007; Fila & Smith, 2006; Giles, Connor, McClenahan, Mallett, Stewart-Knox, & Wright, 2007; Gratton, Povey, & Clark-Carter, 2007; Grogan, Bell, & Conner, 1997; Hansen, Jensen, & Solgaard, 2004; Hewitt & Stephens, 2007; Huchting, Lac, & LaBrie, 2008; Jackson et al., 2005; Kassem & Lee, 2004; Knibbe, Oostveen, & van de Goor, 1991; Kvaavik, Lien, Tell, & Klepp, 2005; Lähteenmäki & Tuorila, 1998; Lautenschlager & Smith, 2007; Louis, Davies, Smith, & Terry, 2007; Nejad, Wertheim, & Greenwood, 2004; Norman & Conner, 2006;

O'Callaghan, Chant, Callan, & Baglioni, 1997; Pawlak et al., 2008; Pawlak & Malinauskas, 2008; Raats, Daillant-Spinnler, Deliza, & MacFie, 1995; Raats, Shepherd, & Sparks, 1993; Rosin, Tuorila, & Uutela, 1992; Saba & Di Natale, 1999; Saba, Moneta, Nardo, & Sinesio, 1998; Schifter & Ajzen, 1985; Shepherd, 1990, 1997, 1999; Shepherd & Farleigh, 1986; Shepherd, Sparks, Bellier, & Raats, 1991; Sparks, Guthrie, & Shepherd, 1997; Sparks, Hedderley, & Shepherd, 1992; Sparks & Shepherd, 1992, 1994; Sparks, Shepherd, Wieringa, & Zimmermanns, 1995; Stubenitsky & Mela, 2000; Sun, Guo, Wang, & Sun, 2006; Thøgersen, 1998; Towler & Shepherd, 1992; Tuorila, 1987; Tuorila-Ollikainen, Lähteenmäki, & Salovaara, 1986; Tuu, Olsen, Thao, & Kim Anh, 2008; van der Valk, 1999; Verbeke & Vackier, 2005) and (b) *physical exercise* (e.g., Ajzen & Driver, 1991, 1992; Blue, 2007; Chatzisarantis & Hagger, 2005; Chatzisarantis, Hagger, Smith, & Phoenix, 2004; Courneya, 1995; Downs, 2006; Downs & Hausenblas, 2005; Everson, Daley, & Ussher, 2007; Finlay, Trafimow, & Villarreal, 2002; Lowe, Eves, & Carroll, 2002; Martin, Kulinna, McCaughtry, Cothran, Dake, & Fahoome, 2005; Martin, Oliver, & McCaughtry, 2007; Norman & Conner, 2005; Rhodes, Blanchard, Matheson, & Coble, 2006; Rhodes & Courneya, 2003; Rhodes, Courneya, & Jones, 2002, 2004; Terry & O'Leary, 1995).

Pioneering the development of a genuine model of nutritional psychology, Pudel and Westenhöfer (2003; see also DGE, 1988) developed a "model of cognitive decision making on foods" ("kognitives Modell der Ernährungsentscheidung", Pudel & Westenhöfer, 2003, p. 316), which will be called "Pudel Westenhöfer model" (PWM) in this text. It is one of the least established methods for the prediction of nutrition behavior, no paper could be tracked down that reported on its application, apart from the study reported by the authors themselves (Pudel & Westenhöfer, 2003, pp. 316-331). Yet, as it was meant to model food choice under conditions of opulence while explicitly taking situational aspects into account, it appears to be a promising approach to the explanation of interindividual variance in beverage intake.

All three models (TPB, TRA, PWM) were used in the present study to predict and to explain mineral water intake. They will be outlined in the next sections.

The Theory of Planned Behavior (TPB)

Key Constructs of the TPB

An assumption central to the TPB (e.g., Ajzen, 1991, 2005a) is the idea that the performance of a particular behavior is determined by an individual's *intention* to perform that behavior; the intention is the most important proximal predictor of the behavior. "Intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior. As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance" (Ajzen, 1991, p. 181). But, "the fact that intentions often predict behavior quite accurately does not in itself provide much information about the reasons for the behavior" (Ajzen, 2005a, p. 117).

A behavioral intention can manifest itself as actual behavior only if the behavior is under volitional control, that is, if an individual "can decide at will to perform or not perform the behavior" (Ajzen, 1991, p. 182); in this case, "the attempt will produce the desired act" (Ajzen, 2005a, p. 99). But most intended behaviors, even seemingly simple behaviors like choosing one's favorite brand of mineral water in a shop, will not be under the shopper's full volitional control; the brand may be, for example, temporarily out of stock, or a competing brand from the shoppers relevant set may be on offer at an unexpectedly low price. Therefore, the performance of most intended behaviors depends at least partly on nonmotivational factors, which can be internal to the individual like, for example, abilities, skills, information, or intense emotions, or external such as, for instance, availability of time or money, opportunities, or cooperation of other persons (Ajzen, 1991, 2005a).

These nonmotivational factors, which may interfere with the execution of a behavior, can be characterized as an individual's *actual* control or lack of control, respectively, over the behavior. Thus, "a behavioral intention can best be interpreted as an intention to *try* performing a certain behavior" (Ajzen, 2005a, p. 110). In order to improve the prediction of behavior from intention, it seems to be a promising idea, then, to take additionally into account the degree to which an individual has actual control over performing a specific behavior. Yet a person's actual control is difficult to define and to measure, particularly in naturalistic contexts. Instead, the *perceived* extent to which a person has control over a behavior may be expected to mirror more or less accurately his or her level of actual control and may thus be used as a proxy for it (Ajzen, 1991, 2005a).

Hence, the third component of the TPB, besides the behavior and the intention to perform it, is a person's *perceived behavioral control*. This component is assumed to have an impact both on behavioral intention and directly on behavioral performance. The impact on intention is based on the idea that individuals who do not believe that they have the abilities or resources to perform a particular behavior will also not intend to try and perform it. The direct path from perceived behavioral control to the behavior in question reflects the extent of *actual* control over the behavior, though measured as *perceived* behavioral control, and is based on the following reasoning: If, to give an example, a person goes regularly to the same supermarket with the firm intention to buy a particular brand of mineral water, he or she may sporadically not perform the purchase behavior because the brand is out of stock. This temporary unavailability of the brand, however, is beyond the shopper's control over the purchase act. Here it is not the *perception* of a supply problem that hampers behavioral performance, it is the *actual* unavailability of the brand that will cause the shopper not to buy it; yet, the occasional out-of-stock experience may not change his or her *intention* to buy the brand whenever he or she goes shopping. And the more validly *perceived* behavioral control as a model component indicates *actual* control, the more reliably it may make a direct contribution to the prediction of actual behavioral performance (Ajzen, 1991, 2002a, b, 2005a; Rutter & Quine, 2002b; Stroebe, Eagly, & Ajzen, 1996).

According to the TPB, two further components determine an individual's intention to perform a behavior and may hence influence his or her actual behavior: *attitude toward the behavior* and *subjective norm*. While the subjective norm reflects a person's perceived social pressure to perform or not to perform a particular behavior, the attitudinal element refers to an individual's positive or negative evaluation of performing that behavior (Ajzen, 1991, 2002a, 2005a). "Generally speaking, people intend to perform a behavior when they evaluate it positively, when they experience social pressure to perform it, and when they believe that they have the means and opportunities to do so" (Ajzen, 2005a, p. 118).

All three predictors of behavioral intention (attitude toward the behavior, subjective norm, perceived behavioral control) can be ascertained in two different ways: (a) *directly* by asking individuals to assess each on a set of scales and (b) *indirectly* on the basis of corresponding behavioral, normative, and control *beliefs* which form the cognitive and affective substructures of the three predictors. These beliefs make it possible not only to predict intention and behavior but to explain them by gaining insight into the antecedents of their predictors that is, by studying the informational foundation of the behavior in question (Ajzen, 1991, 2002a, 2005a).

The relationships between the theoretical constructs of the TPB are shown in Figure 2. The constructs are latent variables, which cannot be observed directly but need to be inferred from observable responses, for example, to scales on a questionnaire. The arrows in Figure 2 indicate postulated directions of causal influence of one model component on another (Ajzen, 2002a, 2005a).

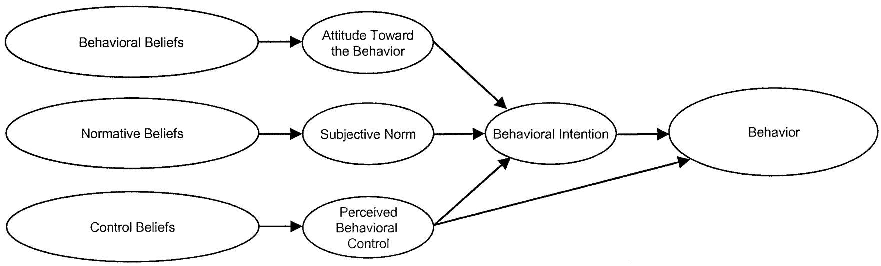

Figure 2. Structural model of the theory of planned behavior (TPB).

The TPB, as well as its earlier version, the TRA (see below), has not only been used in numerous studies for modeling determinants of behavior in a wide range of domains including health-related behaviors (for citations see above), but their components have indeed proven to be able to predict considerable shares of variance in both behavioral intentions and actual behaviors. Several meta-analyses of applications of both models exist, reviewing hundreds of studies with tens of thousands of participants (e.g., Ajzen, 1991, 2005a; Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Armitage & Conner, 2001a; Axelson & Brinberg, 1989; Cheung & Chan, 2000; Godin & Kok, 1996; Shepherd, 1990; Sheppard, Hartwick, & Warshaw, 1988; Sutton, 1998). Among other issues, the studies covered by these meta-analyses comprised health-related topics like condom use, smoking cessation, seeking medical care, wearing a dust mask, using a seat belt, physical exercise, and nutrition-related behaviors (like, e.g., consumption of various kinds of food, feeding babies, reducing fat intake or body weight, hunting).

Ajzen (2005a) summarizes these and other sources by reporting ranges of mean correlation coefficients that were found between (a) the predictors in the TPB or TRA and (b) behavioral intention or actual behavior. Table 3 provides a condensed overview of these coefficients.

Table 3

Meta-Analytically Derived Ranges of Mean Correlation Coefficients Between TPB Components

Component	Behavioral Intention	Behavior
Attitude toward the behavior	.45 to .60	-[a]
Subjective norm	.34 to .42	-[a]
Perceived behavioral control	.35 to .46	.37[b]
Behavioral intention	-	.45 to .62

Note. Mean *R* of behavioral intention with attitude toward the behavior, subjective norm, and perceived behavioral control ranges from .63 to .71. Compiled by the present author from Ajzen (2005a, pp. 94, 100, 120).

[a]Coefficients were not calculated or not reported because the TPB does not postulate these relationships. [b]Only one meta-analysis was reported.

There is, of course, considerable variance between the many studies underlying this overview in terms of, for example, the domains the behavior was sampled from, the measures used as predictors (i.e., direct vs. indirect), the compositions of the person samples, or whether analyses were performed using manifest or latent variables. These differences contribute to the differences in relative weight of influence of the components when predicting intention or behavior. At the most general level, however, it can be stated that (a) all predictors have the potential for explaining significant shares of variance in the dependent variables; (b) subjective norm tends to have a lower explanatory power, if any, than attitude or perceived behavioral control, specifically in the field of health-related behaviors; and (c) intention is the most important predictor of behavior though perceived behavioral control is in fact capable, but not in all instances, of explaining an additional share of variance over and above intention. Also, particularly in the domain of health-related behaviors, the share of explained variance in behavioral intention is higher on average (41%) than in actual behavior (34%), while the share of explained variance in *specific* dietary behaviors like mineral water intake can be expected to be higher than in more *global* dietary behaviors or outcomes like keeping a low-fat diet (Ajzen, 2005a; Conner & Armitage, 2002, 2006; Godin & Kok, 1996; Rutter & Quine, 2002b). When judging these findings, it should be kept in mind, though, that meta-analytic results tend to be positively biased because they are based on successfully published papers; weaker results are more likely to remain unpublished ("file drawer problem", Armitage & Conner, 2001a, p. 479; Scholz & Schwarzer, 2005, p. 396).

For the TPB to be able to explain substantial shares of variance, it is necessary for researchers to adhere to the above mentioned principle of compatibility (see chap. 2.2) which requires both all the predictors and the behavioral criterion to be measured at the same level of generality or specificity. When the behavior is defined in terms of its target, action, context, and time, the predictors need to be specified in the same terms too (Ajzen, 2002a, 2005a, b). In the present study, the behavioral criterion was defined as the total amount of mineral water participants ingested during the 7 days of the data collection period that was immediately following the briefing session, while living freely in their natural environments. The items on the questionnaire measuring the predictors like intention were referring to the same behavior and time frame (e.g., "How much mineral water do you intend to ingest overall during the next 7 days?"; see Appendix B1, Question H12).

Direct and indirect, belief-based constructs in the TPB (i.e., attitude toward the behavior, subjective norm, perceived behavioral control) and their measures will be explicated in more detail in the following sections.

Direct Measures of the Predictors in the TPB

Central to both the TPB and the TRA is the *attitude* concept. Not surprisingly, this is a notion which is as difficult to define in a generally accepted manner as is the trait concept; and like the latter, it has attracted much attention throughout the history of modern psychology. According to Ajzen (2005a, p. 3), "an attitude is a disposition to respond favorably or unfavorably to an object, person, institution, or event". This definition reveals three important aspects of an attitude: (a) the process of evaluation, (b) the existence of an object to which the attitude is oriented, and (c) its character as a behavioral disposition. The attitude concept shares this latter aspect with the trait concept, but it differs from it insofar as a trait is not necessarily evaluative, the responses that reflect a trait are not directed toward a particular external target, and traits are seen as being less easily modifiable; yet, both attitudes and traits are conceived of as capturing the residues of an individual's past experience. Traditionally, the attitude concept entails three categories into which both the experiences that lead to the formation of a specific attitude and the responses that can be traced back to an existing attitude can be subdivided: (a) cognition; (b) affect; and (c) conation, that is, behavior. The cognitive element consists of beliefs about the attitude object, affect refers to emotions and feelings elicited by the attitude object, and the behavioral component embraces behavioral intentions and actual behavior directed at the attitude object (Ajzen, 1991, 2001, 2005a; Bohner, 2001).

In the context of the TPB, by contrast, cognition, affect, and conation are not viewed as three components of a superordinate attitude concept, instead, they are treated as three separate, though logically interrelated, constructs: (a) Conation translates into behavioral intention; (b) TPB's construct of *attitude toward the behavior* in question is the traditional attitude concept but narrowed down to its evaluative dimension (e.g., good vs. bad, worthless vs. valuable), which is a characteristic attribute, or the lowest common denominator, of most of the contemporary definitions of attitude; and finally, (c) cognition refers to the belief-based, informational foundation of the attitude toward the behavior, that are the salient or accessible beliefs held by an individual about the consequences of his or her behavior. These constructs are linked together: "A causal sequence of events is posited [by the TPB] in which actions with respect to an object follow directly from behavioral intentions, and intentions are evaluatively consistent with attitudes that derive reasonably from accessible beliefs about the behavior" (Ajzen, 2005a, p. 30). It is important to note that the attitude concept within the framework of the TPB is not meant to refer to an arbitrary object, person, institution, or event, but it is supposed to refer always toward a particular behavior or outcome of a behavior which the individual intends to perform; and all TPB components need to be measured at the same level of generality or specificity (Ajzen, 1991, 2002a, 2005a).

As was indicated above, the three predictors in the TPB (i.e., attitude toward the behavior as well as subjective norm and perceived behavioral control) can be ascertained in two ways, directly and indirectly; indirectly means based on beliefs like, as in the case of attitudes, beliefs toward the behavioral consequences. The terminology seems to be a bit blurred here, because the names of the three predictors are used sometimes to designate the direct measures, to be explicated now, and at other times to denote the belief-based measures, which will be clarified in the next section. In consequence, the notion attitude within the framework of the TPB seems to be attributable also to the cognitive, belief-based determinants.

In order to obtain a *direct* measure of an *attitude toward a behavior*, that is, "a person's overall evaluation of performing the behavior in question" (Ajzen, 2002a, p. 5), any standard attitude scaling procedure can be used, for example, Likert scaling (cf., e.g., Oppenheim, 1992). Three types of items are recommended to be used for the scale: instrumental and experiential ones and those capturing overall evaluation. Instrumental items are related to the effect of the behavior (e.g., "would be harmful to me"); experiential ones reflect how it feels to perform the behavior (e.g., "would be unpleasant"); overall evaluation can be measured with items like "would be a good thing to do" (Ajzen, 2002a; Francis et al., 2004). In the present study (see Appendix B1, Question H18), eight items of all three types referring to a participant's mineral water consumption during the next 7 days were administered and were arranged with changing evaluative directions of their wordings. Response format was a 7-point rating scale that ranged from 1 (*strongly disagree*) to 7 (*strongly agree*).

The *subjective norm* component in the TPB is the perceived normative prescription or general social pressure to perform or not to perform a particular behavior. There are two types of items that can capture subjective norm directly: those that have an injunctive quality, which is quite consistent with the concept of subjective norm (i.e., items expressing what important others expect a person to do or to refrain from), and those that describe whether important others themselves perform the behavior in consideration, assuming that they will act in a way that they would want the respondent to behave too (Ajzen, 1991, 2002a, 2005a; Bohner, 2001; Conner & Armitage, 2002; Francis et al., 2004). In this study (see Appendix B1, Question H20), six items were given to respondents, four of which were injunctive (e.g., "Most people or institutions whose opinion about nutritional issues I appreciate would encourage me if I drank mineral water as frequently as possible instead of other beverages") using again a 7-point rating scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*); and two had a descriptive quality (e.g., "According to my appraisal, most people whose opinion about nutritional issues I appreciate tend to drink mineral water *seldom - frequently*").

Perceived behavioral control, the third predictor in the TPB, "refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles" (Ajzen, 2005a, p. 111). Despite the ostensible plausibility of this definition, there has been considerable dispute about the homogeneity and the operationalization of this construct (cf., e.g., Ajzen, 2002b; Armitage & Conner, 1999b, 2001b; Cheung & Chan, 2000; Conner & Armitage, 1998; Sparks, Guthrie, & Shepherd, 1997); "the central issue is whether the ... components of perceived behavioral control, *perceived difficulty* and *perceived control* [italics added], can be considered to form a unidimensional construct labelled 'perceived behavioral control'" (Cheung & Chan, 2000, p. 7).

The first subconstruct, perceived difficulty, is related to the ease or difficulty of performing a behavior or to the confidence a person has in his or her abilities to perform a behavior; this is conceptually quite close to perceived self-efficacy (cf., e.g., Bandura, 1997), "the subjective probability that one is capable of executing a certain course of action" (Ajzen, 2005a, p. 93), "the degree of anticipated difficulty in performing a behavior" (Ajzen, 2001, p. 44), or more generally, "an individual's sense of their abilities, of their capacity to deal with the particular sets of conditions that life puts before them" (Reber, 1995, p. 702). Perceived control or perceived controllability, on the other hand, is about "whether people believe that they have volitional control over performance of a behavior" (Ajzen, 2001, p. 44) that is, whether behavioral performance is up to the acting person (Ajzen, 2001, 2002a, b, 2005a). Ajzen (2001, 2002a, b) explicitly acknowledges the potential existence of these two subconstructs of the perceived-behavioral-control component in the TPB, though he refrains from generally recommending to treat them as two separate constructs in applications of the TPB; he rather suggests to construct items for assessing both subconstructs.

In order to tap the *perceived-difficulty* or *self-efficacy* component, Ajzen (2002a) suggests to use items aiming at the difficulty of performing a behavior or at the likelihood of being able to perform it; items assessing the *perceived controllability* of a behavior usually address respondents' beliefs that they have control over the behavior or that performing it is up to them (see also Ajzen, 2002b; Armitage & Conner, 2001b; Cheung & Chan, 2000; Francis et al., 2004; Sparks, Guthrie, & Shepherd, 1997). In this study (see Appendix B1, Questions H21, H22), eight items were given to respondents to obtain a direct measure of perceived behavioral control, four of which were meant to measure perceived difficulty or self-efficacy (e.g., "If I wanted to, it would be very easy for me to drink mineral water at least once a day during the next 7 days"; response format: 7-point rating scale from 1 *strongly disagree* to 7 *strongly agree*), while four others were intended to assess perceived controllability (e.g., "Whether I drink much mineral water during the next 7 days, is *not at all - entirely* up to me").

Indirect Measures of the Predictors in the TPB

Indirect, belief-based constructs are the immediate antecedents of the three predictors of behavioral intention (i.e., attitude toward the behavior, subjective norm, and perceived behavioral control); they make up the informational, cognitive foundation of the behavior (see Figure 2).

In the case of the *antecedents of attitude toward the behavior*, a person is thought to hold a number of different, readily accessible (i.e., salient) beliefs about the consequences of a behavior, called behavioral beliefs, which determine his or her attitude towards it. When attitudes are formed, the cognitive processes inside the person can be modeled by computing each of these behavioral beliefs by multiplying (i.e., weighting) the *behavioral belief strength* (i.e., the persons's subjective probability that performing the behavior in question will lead to a specific outcome; b_i) with his or her *outcome evaluation* (i.e., the value he or she attaches to that outcome; e_i). The resulting products that is, the *behavioral beliefs* are then summed to obtain an estimate of the attitude toward the behavior based on that person's accessible beliefs about the behavior (A_B). Put more formally for i accessible beliefs: $A_B = \Sigma b_i e_i$ (e.g., Ajzen, 2002a, 2005a; Conner & Armitage, 2002, 2006; Francis et al., 2004).

In this study, belief strength (b) was assessed by 20 items like "Drinking mineral water fosters my health" (response format: 7-point rating scale ranging from 1 *strongly disagree* to 7 *strongly agree*), each of which was matched by a corresponding item measuring outcome evaluation (e) like "I think the characteristic of a beverage of fostering my health is *particularly negative - particularly positive*" (see Appendix B1, Questions H23, H24).

The *antecedents of the subjective-norm* construct are modeled in a similar fashion. The subjective norm regarding a particular behavior (i.e., the social pressure to perform or not to perform that behavior) is determined by normative beliefs which are a "person's beliefs that specific individuals or groups approve or disapprove of performing the behavior" (Ajzen, 2005a, p. 124). These important referents can be, for example, a person's parents, spouse, children, employer, coworkers, physician, or nutrition consultant. In general, "people who believe that most referents with whom they are motivated to comply think they should perform the behavior will perceive social pressure to do so" (Ajzen, 2005a, p. 124). Again, two questions are asked in relation to every important referent to obtain a measure of the corresponding normative belief: *normative belief strength* (i.e., the degree to which the person is convinced that the referent approves or disapproves of the behavior in question; n_j) and the person's *motivation to comply* with that referent (m_j). After multiplication, the resulting products that is the *normative beliefs* are summed to obtain an estimate of the subjective norm based on the person's j accessible normative beliefs (SN): $SN = \Sigma n_j m_j$ (e.g., Ajzen, 2002a, 2005a; Francis et al., 2004).

Normative belief strength (n) was assessed in this study by seven items like "My parents think I should drink *very little - very much* mineral water". They were matched by corresponding items measuring the person's motivation to comply with this referent group (m): "Generally, when deciding on the usage of a beverage, I am willing to comply with what my parents want me to do" (response format: 7-point rating scale ranging from 1 *strongly disagree* to 7 *strongly agree*; see Appendix B1, Questions H27, H28).

Finally, the *antecedents of perceived behavioral control* are also imagined to consist of beliefs; in this case, they are termed control beliefs, and they are "about the presence or absence of factors that facilitate or impede performance of the behavior" (Ajzen, 2005a, p. 125). They may be based on earlier experience with performing the behavior, but they will also most likely be influenced by information about the behavior, by observing other persons while performing it, or by other factors that may increase or decrease the perceived difficulty of performing it. "The more required resources and opportunities individuals think they possess, and the fewer obstacles or impediments they anticipate, the greater should be their perceived control over the behavior" (Ajzen, 2005a, p. 125). Once more, two items are administered, one to ascertain the *control belief strength* (i.e., the expected likelihood to which a given facilitating or impeding factor will be present when the behavior is performed; c_k), and a matching question to measure its *control belief power* (i.e., the facilitating or impeding force of that factor when the behavior is performed; p_k). Both are again multiplied, and the products that is, the *control beliefs* are summed to obtain an estimate of the perceived behavioral control construct based on the person's k accessible control beliefs (PBC): $PBC = \Sigma c_k p_k$ (e.g., Ajzen, 2002a, b, 2005a; Francis et al., 2004).

In the present study, control belief strength (c) was measured using 10 items of the type "For the next 7 days, I expect very warm weather" (response format: 7-point rating scale ranging from 1 *strongly disagree* to 7 *strongly agree*), each of which was matched by an item assessing the corresponding control belief power (p), for example, "If the weather is really very warm during the next 7 days, that will make it *rather difficult - rather easy* for me to drink much mineral water" (see Appendix B1, Questions H29, H30).

It is important to note that the predictive and explanatory power of the belief-based measures explicated above is confined to *salient* beliefs, that is beliefs that are readily accessible in memory. While individuals can hold a large number of beliefs about any object or behavior, it is only a subset of them that are salient at a given point in time and that are relevant to the formation of a particular behavioral intention. Ajzen (e.g., 2002a, b), therefore, stresses the need for conducting pilot work to identify readily accessible behavioral, normative, and control beliefs in the relevant subpopulation (see also, e.g., Conner & Armitage, 2002, 2006). For including only salient beliefs in the application of the TPB in this study, a qualitative study was run prior to the quantitative main study in order to elicit modal accessible beliefs among students (see chap. 4).

It is also noteworthy that the TPB does not pretend to describe realistically all psychological processes that precede a behavioral act or that are involved in the formation of a behavioral intention. As was already said above regarding the relationship between perceived behavioral control and actual behavior (see Figure 2), perceived behavioral control may be considered a proxy for a measure of actual control and as such, it may well help to predict actual behavior independently of behavioral intention, but it must not be conceived of as a direct *cause* of actual behavior. In a similar vein, the formation of attitude toward the behavior, of subjective norm, and of perceived behavioral control according to the above specified equations may suggest that a person, while being in the decision making process, runs through the list of beliefs and actually computes the products and sums them up. "In actuality, although the investigator does perform these computations, people are *not* assumed to do so. We merely propose that attitude formation may be *modeled* in this fashion" (Ajzen & Fishbein, 2000, p. 6).

In several of the above mentioned applications of the TPB to nutrition or exercise behavior, researchers tried to extend the TPB and added variables to the model in order to increase the proportion of explained behavioral variance (see, e.g., Conner & Armitage, 2002). Although some of the attempts were successful from a statistical point of view, Ajzen (e.g., 2005a, p. 134-136) holds that the TPB is complete and sufficient to explain why individuals make decisions the way they do. Though he does not ignore the fact that other variables from personal, social, and informational categories ("background factors", Ajzen, 2005a, p. 134) may empirically turn out to be influential, he argues that there is no necessary relation between them and the more proximal determinants of behavioral intention and actual behavior that are postulated by the TPB. Also, if these background factors do have some effect, their influence is assumed to be mediated by TPB predictors insofar as they influence the beliefs underlying the predictors (see also Conner & Armitage, 1998, 2002). In Bandura's (1997) opinion, one should be very conservative, therefore, about any premature extensions of the TPB when pursuing some sort of "cafeteria-style theorizing" (p. 285). In the present study, no such background factors were incorporated into the TPB, however, it was extended to include behavioral intentions and actual behavior from other behavioral domains and an environmental factor (see chap. 3 and 5).

The informational foundation of the predictors of behavioral intention in the TPB (i.e., the beliefs underlying attitude toward the behavior, subjective norm, and perceived behavioral control) is an application of the expectancy-value theory which is a general model of human decision making. It assumes, like Herrnstein's matching law and optimal foraging theory (see above), that individuals try to maximize their chances of desirable outcomes while minimizing the chances of undesirable ones. Expectancy-value theory predicts, for instance, that a shopper when being faced with a number of beverages in a supermarket will decide to choose that product from the shelf which is associated with the most desirable outcome for him or her, that is, which promises the relatively highest subjective expected utility. The utility scores that a consumer assigns to every product from a given set during the choice process can be computed on an individual basis, provided that information is available about the strengths and outcome evaluations of all relevant (i.e., salient or accessible) behavioral beliefs the person holds towards buying one of the products. Computations follow the same procedures as those described above for the behavioral beliefs in the TPB (e.g., Ajzen, 2001, 2005a; Bohner, 2001; Conner & Armitage, 2002, 2006; Pervin, 2003).

Therefore, the TPB as an expectancy-value approach belongs to the field of rational choice theory "in which it is maintained that social life is principally capable of explanation as the outcome of the 'rational choices' of individual actors" (Jary & Jary, 2000, p. 510). Its "fundamental assumption is that agents are rational in the sense of maximizing expected utility" (Colman, 2003, p. 616). Although other expectancy-value theories exist (cf., e.g., Pervin, 2003, pp. 307-310), and despite the many successful applications of the TPB to food choice behavior (for citations see above), the adequacy of the rational-choice rationale for researching into food choice has been questioned.

Köster (2003; 2009), for example, pointed out that food-choice issues are strongly related to the so-called lower senses (i.e., smell, taste, touch) which are often not in the center of an individual's conscious attention and may thus lead to emotionally based, nonrational decisions (see also Conner & Armitage, 2002; Ogden, 2003). Still, individuals in Germany and in other Western societies tend to rationalize their behavioral motives in order to make their behavior appear reasonable and based on rational grounds. A problem arises when information for food choice modeling is obtained by asking respondents directly for their food-related behavioral intentions or attitudes or for the hedonic appeal of food items. When being asked why they choose a certain food item, for example, respondents are very likely not to know the reason; nevertheless they will try and give an answer in order to please the investigator, though the answer does not necessarily reflect their real motives for choice.

In line with this reasoning, Pudel (2001) gave an example of a question he asked in a representative survey: "Why is bread ejected from the toaster?" ("Warum springt Toast aus dem Toaster?"; p. 47). About 80% of his respondents said "Because it is finished" ("Weil er fertig ist") although, according to Pudel (2001), they had no clue why the toast was really ejected. The proper answer would have been "I don't know", but that would have generated cognitive dissonance which humans generally tend to avoid or to reduce. Since it may be very demanding to overcome some of these difficulties when ascertaining attitudes and other predictors of food choice, Köster (2003) recommended researchers to use at least actually performed behavior, rather than behavioral intention, as the dependent variable. His advice was complied with in the present study.

When the direct measures of the TPB (i.e., attitude toward the behavior, subjective norm, and perceived behavioral control) are predicted on the basis of corresponding indirect, belief-based measures by multiplying together two of their components (like behavioral belief strength and outcome evaluation; see above), there is one severe problem related to this calculation which, quite surprisingly, does not appear to have received much attention by the majority of researchers in the field (e.g., Cheung & Chan, 2000; for exceptions see, e.g., Doll & Orth, 1993; Shepherd, Sparks, Bellier, & Raats, 1991; Sonnenmoser, 1997). Instead, "investigators continue to use multiplicative composites in simple bivariate correlational analysis" (Evans, 1991, p. 6), although "a number of forceful statements in the literature" (Evans, 1991, p. 6) have posed the problem at least since 1973:

> Multiplication of scales, in order to be logically meaningful, requires the existence of a true rational zero point on both the measures entering into the product.... If such a zero point cannot be shown to exist, and the measures are therefore at best interval in nature (equal intervals with the location of the zero point arbitrary), then any transformation of the general form $X + b$ (where $X =$ the scale score and $b =$ some positive or negative constant) leaves the scale invariant; that is, such transformations change the location of the arbitrary zero point but preserve unchanged all meaningful properties of the scale, i.e., rank order and equal interval properties and the scale *SD*. Yet it can be shown empirically ... that *such transformations of measures of V* [valence] *and E* [expectancy] *can modify, sometimes drastically, the correlation between the product E x V and a third variable* [italics added]. (Schmidt, 1973, p. 244)

Indeed, scaling procedures recommended by Ajzen (2002a), and those used in this study, which do not allow for an "a priori way to determine the proper scaling of belief strength and outcome evaluation" (Ajzen, 2002a, p. 10), deliver at best interval-scaled scores without a true zero point (e.g., Ajzen, 1991; Doll & Orth, 1993; Schmidt, 1973). The lack of a true zero point implies that scores can be linearly transformed according to whatever the researcher considers to be psychologically meaningful including a shift in the polarity of the scale.

However, applying linear transformation to a given interval scale (like behavioral belief strength) and multiplying it by another interval scale (like outcome evaluation) will result in a *nonlinear* transformation of the product term, which may substantially alter the size of the correlation coefficient between the multiplicative composite and another variable like the direct measure of attitude toward the behavior (for demonstrations of this effect see, e.g., Ajzen, 1991, p. 194; Laroche, 1978, p. 177; Schmidt, 1973, p. 248).

In consequence, if a constant is arbitrarily added to or subtracted from the scores of a given interval scale, it will neither change the rank order of the scores or the equal intervals between them nor the standard deviation of their distribution, but "such perfectly legitimate ... transformations play havoc with the correlations obtained by a multiplicative multiattribute model, thereby *rendering the interpretive comparisons of the correlational results rather nebulous* [italics added]" (Holbrook, 1977, p. 165). Put in other words, the size of a correlation coefficient between a multiplicative composite whose components are measured at interval scale level only (instead of ratio scale level) and a third variable is scale dependent and thus lacks "formal meaningfulness" (Doll & Orth, 1993, p. 399); hence, results from correlational or regression analyses or from structural equation modelings (SEM) may not be comparable between different studies (Ajzen, 1991, 2002a; Doll & Orth, 1993; Evans, 1991; Holbrook, 1977; Laroche, 1978; Orth, 1985; Schmidt, 1973).

At least two suggestions have been made to overcome these difficulties: applying *hierarchical regression analysis* (Evans, 1991) and *optimal scaling* (Holbrook, 1977; Orth, 1985). Hierarchical regression tests the validity of the expectancy-value approach. It aims at regressing the direct measure of attitude toward the behavior (A_B) on both components of the multiplicative composite, that is, behavioral belief strength (b_i) and outcome evaluation (e_i; *a* denoting regression coefficients):

$$A_B = a_1\,\Sigma b_i + a_2\,\Sigma e_i. \qquad (1)$$

Then, it checks in a second step whether the product-sum term ($\Sigma b_i e_i$) accounts for an additional part of the direct measure's variance over and above the contribution of the sums of its components (Doll & Orth, 1993; Evans, 1991):

$$A_B = a_1\,\Sigma b_i + a_2\,\Sigma e_i + a_3\,\Sigma b_i e_i. \qquad (2)$$

This approach has been criticized because it "is all very well and good from a statistical perspective, but unfortunately lacks theoretical import. Existing tests of the hierarchical regression procedure suggest that the interaction term [$\Sigma b_i e_i$] is often not significant ..., and one is left with an 'additive model' that predicts attitude from expectancies and evaluations separately. However, *this model is not theoretically meaningful* [italics added]" (Eagly & Chaiken, 1993, p. 235), that is, it does not reflect the information-integrating mental process postulated by the TPB.

Optimal scaling, on the other hand, which was originally suggested by Holbrook (1977; but see also Orth, 1985), is a procedure that adds an empirically derived constant to each of the interval-scaled components of a multiplicative composite and thus, while retaining the interval scale properties of the scores after rescaling, allows for making "formally meaningful statements" (Doll & Orth, 1993, p. 400) in the context of expectancy-value models like the TPB. After optimal scaling has been performed on a given data set, correlation coefficients between the multiplicative composite and a third variable are maximized and therefore supply the foundation for a fair comparison between competing models or between results from different samples. Contrary to the hierarchical regression approach, optimal scaling does not test but assumes the validity of the expectancy-value approach. (Ajzen, 1991, 2002a; Doll & Orth, 1993; Eagly & Chaiken, 1993; Holbrook, 1977; Laroche, 1978; Orth, 1985, 1987).

It has been shown that the following regression analysis results in a least squares solution for determining the additive rescaling constants for the components of a multiplicative composite. First, the direct measure of attitude toward the behavior (A_B) can be taken as a criterion and can be regressed on the sum of the behavioral beliefs ($\Sigma b_i e_i$; with b_i denoting behavioral belief strength; e_i outcome evaluation; a the regression coefficient; c an additive constant; and n the number of salient beliefs taken into account):

$$A_B = a \, \Sigma b_i e_i + c. \qquad (3)$$

In order for the rescaling constants B (for belief strength) and E (for outcome evaluation) to be estimated, they need to be introduced:

$$A_B = a \, \Sigma(b_i + B)(e_i + E) + c. \qquad (4)$$

Expanded, this becomes:

$$A_B = a \, \Sigma b_i e_i + aE \, \Sigma b_i + aB \, \Sigma e_i + aBEn + c. \qquad (5)$$

Division of the *unstandardized* regression coefficient obtained for Σb_i by the value obtained for a gives an estimate of the rescaling constant E (i.e., aE / a), while the division of the coefficient for Σe_i gives an estimate of B (i.e., aB / a; Ajzen, 1991, 2002a; Dohmen, 1985; Dohmen, Doll, & Orth, 1986; Doll & Orth, 1993; Holbrook, 1977; Laroche, 1978; Orth, 1985, 1987). It should be noted that the additive parameters B and E need to be estimated separately for every empirical application of the TPB.

The same procedure can and needs to be applied to the normative and control beliefs within the TPB too to make their components (normative belief strength and motivation to comply, control belief strength and power, respectively) optimally scaled. This was done in the present study (see chap. 5.4).

Optimal scaling was suggested here with the purpose of justifying multiplication of scores even in the case when they are measured at interval scale level only. On the other hand, the question may be asked whether rating scales like those recommended by Ajzen (2002a) and those used in this study deliver scores of more than just ordinal scale quality. It is common practice in socioscientific research, though, to trust in the ability of such scales to measure a characteristic at interval scale level and not to prove it in every instance of their application. The rationale behind this liberal assumption is the conviction that the empirical corroboration of a theoretically derived hypothesis is an indication of the adequacy of the supposition regarding the scale type. In other words, if a scale is wrongly claimed to be an interval scale, the corroboration of a hypothesis will be impeded (Bortz & Döring, 2006, p. 70).

The Theory of Reasoned Action (TRA)

The TRA (e.g., Ajzen & Fishbein, 1980) was the forerunner model of the TPB and "was concerned with the causal antecedents of intentions to perform behaviors over which people have sufficient control" (Ajzen, 2005a, p. 117), that is, it was intended to deal with volitional behavior. It is identical to the TPB except that the construct of perceived behavioral control is missing (see Figure 3).

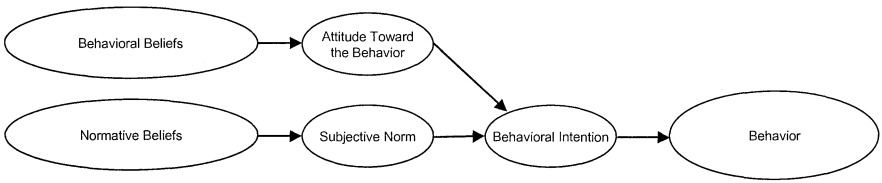

Figure 3. Structural model of the theory of reasoned action (TRA).

When it was later recognized that most intended behaviors were not under full volitional control, the TRA was extended to include the component perceived behavioral control, that is, the perceived extent to which a person has control over the behavior, and it was named TPB (see above and Figure 2). Practically everything that was outlined and explicated in the context of the TPB also holds for the TRA, except all passages related to the control component, of course. Several of the findings and results reported in the preceding section were, in fact, not based on analyses of the TPB but of the TRA.

Though the TRA has proven to be of good use for the prediction of a number of behaviors including nutrition behavior (e.g., Axelson & Brinberg, 1989; Shepherd, 1990; Sheppard, Hartwick, & Warshaw, 1988), researchers nowadays seem to use the TPB more frequently than the TRA for modeling nutrition behavior, as it was found that the perceived behavioral control component "makes a significant contribution to the predictive power of the TRA, providing support for the TPB" (Conner & Armitage, 2002, p. 32). Yet, the TRA, though it may be a bit outdated, is nested in the TPB and thus offers a potentially more parsimonious model of mineral water intake, which can easily be tested when data for the application of the TPB are obtained anyway.

Pudel and Westenhöfer's Model of Cognitive Decision Making on Foods (PWM)

The point of departure for Pudel and Westenhöfer's (2003; see also DGE, 1988) suggestion for a genuine model of nutritional psychology was to account for food-choice decisions under the conditions of abundantly available and easily accessible foods. They did not develop a structural model comparable to the TPB or TRA, but they seemed to have had in mind an approach that is formally similar to expectancy-value theory. According to the PWM, the decision for a particular food product depends on an array of motives, which are individually weighted according to a person's needs and preferences. As food choice is obviously dependent on situation-related factors too (see chap. 2.2), these are taken into account too by obtaining individual weight scores for different situations (Pudel & Westenhöfer, 2003).

Three types of measures need to be obtained in order to predict the choice of a particular food item in a given situation: (a) *evaluation of the situation* in terms of how important each of a list of (salient) attributes is for food consumption in that situation (e.g., "When thinking about drinking a beverage in your home, how important is it for you that it is free of calories?"; s_i); (b) determining the corresponding *image component* of the food product under consideration, that is, the *strength of the belief* that the particular food item does have that attribute (e.g., "Mineral water is free of calories"; b_i); and (c) a preference score for the consumption of the food item in that particular situation, or the estimated likelihood of really consuming the food in that situation (Pudel & Westenhöfer, 2003, pp. 317-319), or even much better: recording *real food consumption behavior in the situation* (*Beh*).

The PWM predicts food consumption by computing the products of all *n* pairs of attributes of the evaluation of the situation (s_i) and the belief strength regarding the image component (b_i) and by submitting them to a multiple regression analysis with the behavioral component (*Beh*) as dependent variable (a_i denote the multiple regression coefficients):

$$Beh = a_1 s_1 b_1 + a_2 s_2 b_2 + \dots + a_n s_n b_n. \tag{6}$$

In order to apply the PWM in the present context, the notion of a situation in which mineral water is or can be consumed was extended to the totality of the habitat, which is the natural environment respondents were living in during the 7-day data collection period. Information about the situational parameters (*s*) was obtained by 20 items like "When deciding on the usage of a beverage during the next 7 days, *I will not care at all* vs. *I will consider it to be extremely important to me* whether it is free of calories" (response format: 7-point rating scale; see Appendix B1, Question H25). Each of these items was matched by a corresponding item (i.e., image component) from the same set that was already used to assess behavioral belief strength (*b*) within the framework of the TPB and TRA, like "Mineral water is free of calories" (response format: 7-point rating scale ranging from 1 *strongly disagree* to 7 *strongly agree*; see Appendix B1, Question H23). Optimal scaling (see above) was applied to the raw scores before they were processed within the PWM (see chap. 5.4).

Although the same items were used for modeling the prediction and explanation of mineral water intake within both the TPB or TRA and the PWM frameworks, each approach requires, strictly speaking, a different type of behavioral beliefs, as was already explained above. While the TPB and the TRA draw upon the beliefs a person holds about the subjective probability that *performing a particular behavior* like drinking mineral water will lead to a specific outcome, the PWM requires information about the beliefs a person holds about a *particular object*, that is, about his or her image of mineral water. Question H23 (see Appendix B1), with which the belief strengths were ascertained, is made up of both types of items. Some of them refer directly to the *consequences of the ingestion* of mineral water (e.g., "Drinking mineral water fosters my health") and are thus in accordance with the requirements of the TPB and the TRA; others (e.g., "Mineral water is free of calories") clearly refer to an *attribute of the object*, not to an immediate outcome of its consumption, and are thus in line with what Pudel and Westenhöfer (2003) demand for their model. Still other items (e.g., "Mineral water quenches thirst better than other beverages") are outcome oriented, but they make no explicit, verbal reference to the behavior or experience of the participant of the study.

When the present study was set up, the intention was to focus data collection on the constructs of the TPB or TRA, which are clearly the more significant and better established approaches to the explanation of nutrition behavior than the PWM. When phrasing the items of Question H23, however, it was felt that any continuous reference of the wordings to the person who was completing the questionnaire made several of the items sound a bit stilted and odd. In consequence, a decision was made to deviate from Ajzen's (2002a) recommendations for the construction of a TPB questionnaire, which was based, and can be justified, on the following grounds: (a) Given the fact that the ingestion of mineral water is probably one of the most ubiquitous and least problem-associated of all everyday nutrition behaviors, there should be no big gap between the beliefs about the attributes of mineral water as an object and the expected consequences that these attributes may entail for a person when ingesting mineral water; also, (b) many of the questions and items preceding Question H23 were explicitly related to the participants' drinking mineral water in the forthcoming 7 days so that a corresponding mental set should have been established by the time the items of

Question H23 were completed, which was supposed to cause participants to interpret them with implicit reference to their own behavior over the next 7 days. In order to keep the length of the questionnaire within reasonable time limits, no extra questions were asked to comply fully with the requirements of the PWM.

Pudel and Westenhöfer (2003) reported on one single, though large-scale, survey where they applied their model to food choice data. Based on a sample that was representative of the West German population, they obtained information on (a) the evaluation of five eating situations (e.g., at home, cafeteria), (b) the attribute profiles (i.e., image components) of six food items (e.g., steak, fruits, French fries), and (c) preference scores for the consumption of each of the foods in each of the situations. They found that correlation coefficients between preference scores obtained for the consumption of food items in these situations and preferences predicted from the model ranged from $r = .18$ to .49 (p. 323).

CHAPTER THREE

Objective and Purpose of This Research Project

The preceding two chapters should have made several points clear: Eating solid foods and drinking beverages are among the most elementary and most frequently repeated behavior patterns of all human beings. Food acquisition, preparation, and consumption are a constitutive characteristic of human civilization. Adequate nutrition and healthy food patterns make up one of the cornerstones of individual and public health, or put in other words, malnutrition and unfavorable food patterns are potentially life-threatening, and they cause Germany's national economy to spend an enormous amount of money every year on treating nutrition-related diseases in the population.

Water, and especially in Germany and in other affluent Western societies *mineral* water, is one of the most important food items in human nutrition in terms of bodily requirements, actual consumption, and recommended consumption when losses of body water need to be replenished through intake of beverages. While there does not appear to exist an upper physiological limit for the volume of daily water intake (within reasonable quantities of consumption), there are some indications that individuals in Germany tend to ingest less fluid from beverages than they should in order to meet their physiological requirements. Dehydration may result, which may cause impaired physical and mental performance.

In contrast to the fundamental significance of nutrition for individuals and societies during all ages, attempts to understand human nutrition *behavior* have been made very rarely until just a few decades ago. The contribution of psychology and other social sciences to the explanation of nutrition behavior has as yet been only moderate and has been focused on behavioral and experiential aspects of nutrition-related diseases. And although a wealth of information about foods, bodily requirements, and also nutrition behavior has been accumulated throughout the last few decades, many of the available pieces of information appear to be isolated and to lack integration and coherence. There is particularly little knowledge available of the determinants of normal, everyday eating behavior and even less of daily, clinically inconspicuous drinking behavior; and hardly any publication can be found that aimed explicitly at explaining mineral water intake with the outstanding exception of Wüstefeld-Würfel's (1999) doctoral dissertation on "Consumers' View on Mineral Water" ("Mineralwasser aus Konsumentensicht").

In her exploratory study, Wüstefeld-Würfel (1999) conducted a representative survey using a random sample of the German population, which was generated by the Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute e.V. (a so-called ADM master sample); she ascertained information by administering an extensive questionnaire in face-to-face interviews. In her dissertation, she gave a wealth of detail regarding usage patterns of mineral water and attitudes towards mineral water and thus made an extremely valuable contribution to the understanding of why, when and where individuals consume mineral water and to the description of how mineral water is perceived and evaluated by the general population.

But Wüstefeld-Würfel (1999) designed the empirical part of her study in the fashion of what market researchers call a "usage and attitude" study, which is, from a psychological point of view, suboptimal in at least two ways with regard to the identification of the *determinants* of mineral water intake and the assessment of their strength of influence on intake: (a) She asked her respondents directly for their consumption motives and did not go beyond tabulating and interpreting these mental representations of respondents' own behaviors, neither by employing psychological tests, scales, or other instruments for ascertaining psychological constructs nor by performing statistical procedures for in-depth analyses of her data in order to establish, for instance, the influence of attitude towards mineral water on its intake; and (b) she relied on her respondents' verbally claimed habitual consumption behavior rather than collecting information on actual mineral water intake.

The purpose of the present study is to add a piece of empirically derived information to the small amount of existing knowledge in the field of everyday beverage intake behavior. The study is exploratory in nature too as it tries to research into a behavioral phenomenon which has not been thoroughly investigated before. The point of departure for the study was the obvious interindividual differences in the volume of mineral water intake that can be observed between ordinary people in their natural environments every day. And the central question that guided the planning and setting up of the study was: How can these differences be explained by drawing upon available psychological theories, models, concepts, instruments, and methods? The idea was to explore a given real-life phenomenon; the idea was *not* to pick a theory, model, concept, instrument, or method and to see how well it works when being applied to nutrition behavior or to study how it can be revised, extended, or otherwise modified with mineral water intake being an arbitrary behavior which the modified version is tested on.

Thus, the objective of this study is to check up on the usefulness of a number of person- and situation-related determinants that can be expected on theoretical grounds to have at least some potential for contributing to the analysis of interindividual variance in day-to-day mineral water intake in naturalistic settings. Although a number of factors that turned out to have some influence on food or beverage intake have been identified in previous research (see chap. 2.2 and 2.3), none of them appears to be a single top candidate for a straightforward prediction and explanation of a major share of variance in mineral water intake. Therefore, a variety of single determinants were selected as predictors to be used in this study, as well as four more sophisticated behavioral models.

The main dependent variable was volume of actual mineral water intake (in ml), which was recorded by the participants together with the volume of all other beverages consumed throughout the course of 7 consecutive days. A 7-day data collection period was chosen in order to cover the vast amount of potential sources of influence on mineral water consumption that may be present in an individual's natural habitat and that may take effect in the course of a week, though presumably not with the same probability on every day of the week or with systematically varied degrees of strength of influence across different days (cf. the distinction between "dry" and "wet" days in research on consumption of alcoholic beverages; e.g., van der Valk, 1999). As the analysis of *within*-subject variation in mineral water intake across the 7 days, which is due to both true fluctuations of ingested volume over time and measurement error, is *not* the objective of this study, data analysis was confined to *between*-subject variation of volume of intake that was aggregated *intra*individually across the 7 days for every participant.

In order to supplement the knowledge generated by Wüstefeld-Würfel (1999), while overcoming some of the disadvantages of her methodological approach, the present study was set up differently in three ways: (a) It employed *psychological* concepts to predict (b) *actual* mineral water intake in naturalistic settings; and (c) many potential predictors, in particular the psychological constructs underlying the TPB, TRA, PWM, and the nutrition-specific traits or trait-like dispositions (see chap. 2.2 and 2.3), were ascertained in a premeasurement session *before* respondents recorded their beverage intake, which makes any modeling of the relationships between the psychological predictors and the dependent behavioral variable logically more sound. A minority of predictors such as respondents' SES and demographic factors, though, were obtained when the data collection period was over in a postmeasurement session or during the data collection period itself.

Yet unfortunately, the present study lags behind Wüstefeld-Würfel's (1999) in terms of representativeness and generalizability of the findings: Instead of using a random sample of the general population, which would have gone far beyond the scope of the available budget, this study resorted to a grab or convenience sample (Last, 2001, p. 162) and to a mixture of what Miles (2001, p. 79) calls a volunteer and opportunity sample of students, most of whom were enrolled in the University of Hamburg and about half of them were majoring in psychology.

It is legitimate to run a study like this, because a gain in the understanding of normal eating and drinking behavior (a) must be expected to be a prerequisite for describing, predicting, and explaining abnormal nutrition behavior or food patterns that increase the risk of coming down with nutrition-related diseases (Diedrichsen, 1995b); (b) will, in consequence, add to the foundation of the development of effective intervention programs that aim at changing nutrition behavior, be it in the domain of nutrition education at the individual level or in the fields of public health nutrition or industrial sales promotion at the population level; and (c) will help to answer one of the key questions raised in 1975 when nutritional psychology was established in Germany and which still waits to be answered up to the present day: Why do people eat and drink the foods and beverages they do (Pudel & Westenhöfer, 2003)?

The research questions addressed in this study were:

1. Is knowledge of the composition of mineral water and how it is manufactured, measured with an ad hoc constructed knowledge test, associated with the volume of mineral water intake?
2. Is dietary restraint, measured as cognitive control of eating behavior (FEV scale 1) associated with the volume of mineral water intake? It is hypothesized that persons standing high on this trait drink more mineral water.
3. Is variety-seeking tendency, measured with the variety-seeking scale (VARSEEK-scale), associated with beverage intake? It is hypothesized that persons scoring high on the VARSEEK-scale (a) have a larger relevant set of different beverages, (b) have a higher volume of total beverage intake, but (c) ingest less mineral water.
4. Is food neophobia, measured with the Food Neophobia Scale (FNS), associated with the volume of mineral water intake or with the number of beverages in an individual's relevant set?
5. Is the attitude toward eating, that is, the importance of eating as measured with scale 1 of the Eating Behavior and Weight Problems Inventory (IEG scale 1), associated with the volume of mineral water intake?
6. Are global daily mood and global daily physical comfort, measured with ad hoc constructed 7-point rating scales and aggregated across the 7 days of the data collection period, associated with volume of mineral water intake?
7. Is the socioeconomic status (SES) of the family of origin, directly assessed by the respondents as their parents' SES on a 7-point rating scale, and that of the respondents themselves as indicated by their personal net income measured

with a 9-point rating scale (both scales were ad hoc constructed), associated with the volume of mineral water intake?

8. Is the total time individuals engage in physical work or labor, such as occupational activities or activities related to the household or garden or in physical exercise ("Sport" in German), aggregated across the 7 days associated with the volumes of total beverage and mineral water intake? It is hypothesized that the longer persons engage in physical work, labor or exercise, the higher will be the volume of total beverage intake and particularly that of mineral water intake.
9. Is the actual or habitual mineral water intake of the respondents, their behavioral belief strengths and outcome evaluations regarding mineral water intake associated with habitual mineral water intake, behavioral belief strengths, and outcome evaluations of other persons who are aged 14 or above, if any, and who are living together with the respondents in the same household thus reflecting mutual social influence? It is hypothesized that corresponding characteristics from both sources are positively correlated.
10. Is the weather associated with mineral water or total beverage intake? It is hypothesized that respondents who record their intake in warmer weather (a) have a higher volume of total beverage intake and (b) ingest more mineral water.
11. Is the relative share of time, aggregated across the 7 days, that respondents spend at home or out of their home, respectively, associated with volume of mineral water intake?
12. Is the theory of planned behavior (TPB) an adequate model for predicting and explaining interindividual variation in volume of mineral water intake?
13. Is the theory of reasoned action (TRA), which is nested in the TPB, more parsimonious in attaining the same goal?
14. Does extending the TPB by adding the potential impact of the weather and of the time spent engaging in physical work, labor or exercise increase the explained variance in volume of mineral water intake over and above the share explained by TPB predictors alone?
15. Is the Pudel Westenhöfer model (PWM) an adequate model for predicting and

explaining interindividual variation in volume of mineral water intake?

The empirical part of this study is divided into two parts: (a) a qualitative first stage, in which modal accessible, salient beliefs of the target population (i.e., students) regarding mineral water consumption were elicited in order to comply with what an application of the TPB or TRA requires (cf. Ajzen, 2002a; Francis et al., 2004); and (b) a quantitative main study, where the information was obtained to answer the above listed research questions. Chapter 4 will give details and results of the qualitative elicitation study; chapter 5 will report on the quantitative main study. Any descriptive results and those that were not derived from theoretical considerations beforehand, will be reported along the way.

CHAPTER FOUR

Qualitative Elicitation Study

4.1 Method

It is intended to apply the TPB and the TRA to mineral water intake in this study. Within the framework of these theories, participants need to fill out scales assessing their indirect, belief-based antecedents of the three predictors of behavioral intention (i.e., attitude toward the behavior, subjective norm, perceived behavioral control), which represent the informational, cognitive foundation that underlie these predictors (see chap. 2.3). It is of vital importance for a successful application of the TPB and the TRA to construct these scales in such a way as to make them comprise the existing modal accessible, salient beliefs regarding the target behavior in the population, which was defined in this study as students who were enrolled in a university or college.

In order to achieve this aim, the salient behavioral outcomes, normative referents, and control factors need to be ascertained empirically from the target population, prior to constructing the corresponding scales for the main study (e.g., Ajzen 1991, 2002a; see also Francis et al., 2004).

Design

Hence, an elicitation study was conducted first, which was designed as a cross-sectional study consisting of face-to-face interviews, which were carried out on the central campus of the University of Hamburg in the fashion of "'man-in-the-street' surveys" (Last, 2001, p. 162). Although whole departments and several institutes of the university were scattered across the city of Hamburg, this place was chosen because (a) the concentration of departments was relatively high there with the Department of Psychology being one of them, (b) it was near the university's administration building, and (c) it was in the immediate vicinity of three of the university's biggest cafeterias. The campus was therefore frequented by many students from many departments including some of those which were located more remotely. It was the place where the probability was felt to be highest that any pedestrian approached for an interview would be a student; and in order to anticipate the composition of the sample of the main study (see chap. 5), students were supposed to have different majors, though about half of them were intended to be students of psychology.

Respondents were interviewed using a short, structured questionnaire (see Appendix A) with six open-ended questions to identify salient behavioral outcomes, normative referents, and control factors.

Participants

Participants were recruited in the fashion of "'man-in-the-street' surveys" (Last, 2001, p. 162) which resulted in a grab, convenience, or opportunity sample (Last, 2001, p. 162; Miles, 2001, p. 79). N = 43 students were interviewed, n = 29 of which were women, n = 20 were students who were enrolled in psychology, and n = 3 said that they never drank mineral water; consequently, these latter persons were not further questioned about their behavioral, normative, or control beliefs. An effective sample size of N = 40 seemed to be sufficient for conducting pilot work for the TPB and TRA, Francis et al. (2004) consider even N = 25 to be enough. Mean age in the sample was M = 23.7 (SD = 3.6) years. Respondents were not paid an incentive for their participation.

Materials

The questionnaire used for eliciting the salient beliefs can be found in Appendix A. The central questions asked in the interview were aimed at tapping respondents' spontaneous associations when they were thinking of (a) the advantages and disadvantages of drinking mineral water, in order to identify behavioral outcomes (see Appendix A, Questions V5 and V6); (b) any persons or organizations who approved or disapproved of their drinking mineral water, thus obtaining their normative referents (see Appendix A, Questions V7 and V8); and (c) any circumstances that made it easier for them to drink mineral water, or that made them drink it more frequently or more volume of it, or any circumstances that made it harder for them to drink mineral water, or that made them drink it less frequently or less volume of it, for detecting control factors (see Appendix A, Questions V9 and V10). This way of eliciting salient beliefs is very close to what Ajzen (2002a) recommends researchers to do (see also Francis et al., 2004).

Procedure

Three interviewers were recruited: two female students of psychology, who received academic credit for their cooperation, and one male student of sociology, who did not receive an incentive. Interviewers were briefed personally by the present author and the interviews were carried out in October and November 2001 during the winter term. Interviewers approached potential interviewees and addressed them by reading out the introductory sentences from the questionnaire (see Appendix A). Interviewees were not preselected, except that the interviewers tried to get hold of as many psychology students as were necessary to make about half of the sample consist of them. In order to achieve this goal, the interviewers lingered in the vicinity of the department of psychology and approached any students passing by for an interview.

Responses to the open-ended key questions of the questionnaire (see Appendix A, Questions V5 to V10) were recorded verbatim by the interviewers and content analyzed and coded by the present author.

4.2 Results

Detailed tables with the responses to these questions and the frequencies of their occurrence can be found in Appendix C.

The salient behavioral outcomes related to drinking mineral water turned out to be the thirst-quenching and refreshing character of mineral water, its healthiness, its good value for money, its low-calorie character which supports dieting behavior, its easy availability, and its neutral, good taste (see Appendix C, Table C1). But the neutral taste was also felt to be a negative aspect of mineral water as it was described by some respondents as being bland, boring, and bad, and inferior to the taste of other beverages. Furthermore, some respondents complained about missing vitamins and too much carbonic acid in mineral water, which may cause stomach trouble. One third of the respondents did not find anything disadvantageous about drinking mineral water (see Appendix C, Table C2).

Respondents' normative referents, who approved of their drinking mineral water, were the family, including partners and parents, and physicians, while friends and persons with whom respondents go out (e.g., to a bar or a party) turned out to be disapproving normative referents. Yet, the majority of respondents was unable to mention any potential referent, neither an approving nor a disapproving one (see Appendix C, Tables C3 and C4).

The major facilitating control factor was physical exercise, that is, respondents felt that while exercising or after sport or physical exercise, they were inclined to drink mineral water more frequently or more volume of it. Warm weather or when respondents felt warm was claimed to be a facilitating factor too, while cold weather or when respondents were cold was an impeding factor. Immediate availability of mineral water or the absence of other (e.g., low-calorie) beverages in a situation seemed to facilitate mineral water intake, while the presence of better tasting beverages impeded the intake. Quite in line with the findings for the normative referents, respondents said that when in social settings, that is, in the company of friends, on a party, in a bar, or when going out at night, they tend to drink mineral water less frequently or less volume of it; on the other hand, in the evening or at night (without making any reference to other persons), respondents tend to ingest mineral water more frequently or more volume of it. It may be hypothesized that when being in these situations at the end of the day, they are not in the company of friends, but either alone or together with their partner, parents, or family. Also, when at work, while studying, or when at the university, seemed to be situations that facilitate mineral water intake. Only a minority of respondents was unable to mention at least one facilitating or impeding factor (see Appendix C, Tables C5 and C6).

These findings were later used for constructing the scales for the measurement of the belief-based antecedents of the three predictors of behavioral intention in the TPB and TRA. They will be referred to again in chapter 5.4.

CHAPTER FIVE

Quantitative Main Study

5.1 Method

The key feature of the present study was a diary that respondents kept to record their beverage intake on a daily basis while living freely in their natural environments. This methodology is rooted in at least two academic traditions: (a) nutrition science, public health, and epidemiology and (b) psychology. And, since "the research community that specializes in the study of ingestive behaviour has largely been cut off from the main areas of research into human psychology" (Booth, 1994, p. 184; see also Köster, 2009), a phenomenon that should have become all too clear from the previous chapters, the diary approach to nutrition behavior is a prime example for this lack of mutual contact between both traditions. Methodological publications in the field of the natural sciences (e.g., Oltersdorf, 1995b; Patterson & Pietinen, 2004; Sichert, Oltersdorf, Winzen, & Leitzmann, 1984) list and discuss diaries, which they also call, for example, food records or food accounts (in German, e.g., "Ernährungsprotokoll" or "Protokoll-Methoden"), together with other methods of assessing food or nutrient intake, but making only few, if any, pertinent cross-references to methods and findings of psychology. Authors in the field of psychology (e.g., Bolger, Davis, & Rafaeli, 2003; DeLongis, Hemphill, & Lehman, 1992; Tennen, Suls, & Affleck, 1991), on the other hand, are concerned with all sorts of behaviors and experiences which can be ascertained through diaries and other self-report methods but hardly ever even mention nutrition behavior as one of them.

According to the psychological classification of Wheeler & Reis (1991), methods for self-reporting small events in natural settings can be classified into three categories: (a) signal-contingent recording, where participants are instructed to report their experiences or behaviors whenever they are being signaled by the researcher by means of a signaling device like a beeper, according to a time-sampling schedule (cf., e.g., deVries, 1992; Hormuth, 1986; Pawlik & Buse, 1996); (b) event-contingent recording, which "requires a report every time an event meeting a preestablished definition has occurred" (Wheeler & Reis, 1991, p. 346); and (c) the oldest of these three methods, interval-contingent recording, where a report is required at regular, predetermined intervals, like in a diary (cf., e.g., Bolger, Davis, & Rafaeli, 2003; DeLongis, Hemphill, & Lehman, 1992).

From the perspective of nutrition science, public health, and epidemiology, methods for the direct assessment of food intake, that is, at the microlevel of individuals or households, can be classified into retrospective and prospective techniques. Among others, retrospective methods, which address *past* experiences or behaviors, comprise (a) 24-hour recalls, where individuals report in detail on all foods and beverages ingested in the past 24 hours; (b) diet histories, where individuals are asked to describe their habitual eating and drinking behavior in order for the researcher "to reconstruct a pattern of food intake typical of a recent week" (Patterson & Pietinen, 2004, p. 72); and (c) food-frequency questionnaires, which, while focusing on frequencies rather than volumes of intake, ask about usage and preparation habits of foods "to capture standardized, quantitative data on usual, long-term diet" (Patterson & Pietinen, 2004, p. 72). All retrospective methods potentially suffer from one main flaw: They depend on the ability of the respondents to properly remember and quantify behaviors and experiences in the past (Oltersdorf, 1995b; Patterson & Pietinen, 2004; Sichert, Oltersdorf, Winzen, & Leitzmann, 1984), and "in general, the literature suggests that people are not particularly adept at recalling events, moods, or cognitions" (DeLongis, Hemphill, & Lehman, 1992, p. 90).

Prospective methods like food records or diaries try to avoid or minimize this "retrospection bias" (Bolger, Davis, & Rafaeli, 2003, p. 589) or "recall error" (DeLongis, Hemphill, & Lehman, 1992, p. 90) by instructing respondents to report repeatedly on their *concurrent* experiences or behaviors as they unfold over the course of time. Several varieties of prospective methods have been described in the literature, but all of them have two characteristics in common: monitoring experiences or behaviors over a certain period of time and keeping records of it. Food or beverage diaries typically require individuals to record their intake on a day-to-day basis both qualitatively in terms of what is being ingested and quantitatively by supplying more or less exact information about the ingested mass or volume of the food (Oltersdorf, 1995b; Patterson & Pietinen, 2004; Sichert, Oltersdorf, Winzen, & Leitzmann, 1984).

All prospective studies, however, potentially suffer from another major flaw: reactance or reactivity, that is, "the property of some psychological measures of yielding scores that are influenced by the participants' ... knowledge that their behaviour is being observed or measured" (Colman, 2003, p. 619). It was found, for example, that rates of reporting events tended to decrease over the data collection period within which a respondent is required to report the behavior (called "pattern of response decay" by Stone, Kessler, & Haythornthwaite, 1991, p. 600), or that, when momentary moods were reported, positive moods tended to decrease rapidly under the influence of the recording procedure itself (Riepe, 2001).

Yet, retrospection bias may also occur in diary studies with a fixed-time schedule where respondents are required to report their behaviors at the end of each predetermined interval as in a food or beverage diary: If the intervals are lengthy, more distant events must be suspected to be recalled less accurately than more recent ones (Bolger, Davis, & Rafaeli, 2003; DeLongis, Hemphill, & Lehman, 1992; Sichert, Oltersdorf, Winzen, & Leitzmann, 1984). But hopefully, "concrete, objective events (e.g., *number of ... beverages consumed* [italics added]) may be less susceptible to recall bias than are transient subjective feelings such as pain or mood" (Bolger, Davis, & Rafaeli, 2003, p. 589). Also, any retrospection bias should be attenuated in diary studies by the fact that respondents, while taking part in the study, are aware of the reporting task whose accomplishment is expected of them. In contrast, when using retrospective methods, respondents need to report on behaviors they performed at times when they had not been aware of the fact that they were going to be questioned about them in the future. Awareness of the task, however, should improve recall of events.

While prospective studies tend to be more demanding, time consuming, and obtrusive for the respondents than retrospective approaches, Lemmens and his colleagues (Lemmens, Knibbe, & Tan, 1988; Lemmens, Tan, & Knibbe, 1992) could establish that beverage diaries covered sales volumes of alcoholic beverages better than a number of retrospective methods, which turned out to be more prone to underreporting due to recall errors, and also that the rank order of participants in terms of consumed volume was relatively stable across different methods.

Gay (2000; see also Sichert, Oltersdorf, Winzen, & Leitzmann, 1984) found that data collection periods of food diaries do not necessarily need to cover a whole week to supply valid estimates of intake: "Population distributions of habitual nutrient intake could be accurately constructed from 4 d weighed diary data" (p. 287); and De Castro (1994) concluded that "the diet diary technique is the method of choice for investigations of the ingestive behaviours of free-living humans" (p. 179).

For a comprehensive discussion of advantages and disadvantages of the various prospective methods from the perspective of the nutrition science, public health, and epidemiology see, for example, Oltersdorf (1995b), Patterson and Pietinen (2004), and Sichert, Oltersdorf, Winzen, and Leitzmann (1984), and from psychology's point of view see, for instance, Bolger, Davis, and Rafaeli (2003), DeLongis, Hemphill, and Lehman (1992), Pawlik and Buse (1996), and Tennen, Suls, and Affleck (1991).

Design

The quantitative main study was set up as a prospective field study following a correlational research design. The main predictor variables were measured before the target behavior was performed and thus prior to the measurement of the dependent variables. Retrospectively reported past behavior was not used as the dependent variable in order to minimize potential recall errors and to enhance logical conclusiveness of the results. Volume of beverage intake, in general, and that of mineral water intake, in particular, the target behavior, were ascertained in naturalistic settings as milliliters ingested per predefined interval by means of a 7-day structured diary. The dependent variables were intended to reflect actual behavior of persons ranging freely in their natural environments while retaining their daily routines.

The study's aim was to ascertain intake of pure, unprocessed mineral water as a drink coming straight from the packaging it was bottled in, and to predict and explain interindividual variation in it; the intention was not to cover any usage of mineral water for making homemade drinks like hot tea or coffee or for nondrinking purposes like cooking, or to include the intake of sodas when their main constituent was mineral water.

A naturalistic approach was chosen in order to ensure ecological validity and representativeness of the behavioral data (cf. Tomiyama, Mann, & Comer, 2009). Data are ecologically *valid* if they were generated in settings where the stimulus conditions originate from a person's everyday life; a sample of real-life settings supplies ecologically *representative* data if it reflects the naturally occurring variances of and covariances between all behavior-determining stimuli in the habitat of that person (cf. Buse & Pawlik, 1990; Pawlik, 1978). Therefore, this approach should ensure that none of the situational factors that determine a person's actual day-to-day beverage intake was missed.

As these factors will most likely not take effect to the same degree every day, a 7-day data collection period was chosen in order to cover all variances and covariances of any potential stimuli exerting their influence in the course of a week. After the diurnal rhythm, the week is certainly another cyclic structure of importance to the performance of food-related behaviors in Western societies, although there are some indications that shorter data collection periods can provide useful information too (e.g., Bundesverband der Deutschen Erfrischungsgetränke-Industrie, 1998; Gay, 2000; Henrichsmeier & Grothe, 1997; Sichert, Oltersdorf, Winzen, & Leitzmann, 1984).

If the situational factors that determine a person's day-to-day beverage intake do not take effect to the same degree every day, intraindividual variation in intake will result, which is likely to be detected by a diary that supplies data for the same behaviors or experiences at different points in time across several days. In the present study, however, any meaningful within-subject variability in the diary data was neglected and treated as error variance too. For this purpose, data were intraindividually aggregated across the 7 days, that is, within-subject variability was averaged out, and were analyzed at the between-subject level only. An aggregate variable like that can be considered as an indicator of habitual mineral water intake at the level of conceptual generality similar to that of a trait, particularly when reports were sampled in natural environments (cf., e.g., Bolger, Davis, & Rafaeli, 2003; DeLongis, Hemphill, & Lehman, 1992; Epstein & O'Brien, 1985; Hedges, Jandorf, & Stone, 1985).

It may be argued, though, that recording beverage intake across 7 days is a disproportionally complex, demanding, and time-consuming approach if only simple aggregates of intake were to be analyzed. Yet the basic idea behind the whole study design was to derive a psychometrically highly reliable and valid measure of mineral water intake in order to predict and explain its interindividual variation. And since retrospective methods for assessing beverage intake were out of the question due to the reasons outlined above, a prospective diary approach to ascertain concurrent behavior was found to be the technique of choice. At the same time, the impact of potentially powerful sources of influence in the natural environments of the respondents were assumed to be highly fluctuating over all days of a week; hence the decision was made to make respondents record their behavior for a full week.

The study involved three stages for every respondent to go through: (a) a premeasurement and briefing session, (b) the 7-day data collection period commencing the day immediately following the premeasurement session, and (c) a postmeasurement and debriefing session that followed the data collection period as soon as possible. In the premeasurement session, respondents were instructed in the use of the diary, and a questionnaire was administered to assess many of the independent variables that were used for answering the above-mentioned research questions (see chap. 3). During the 7-day data collection period, respondents recorded the volumes of all beverages they ingested by means of the diary, on which they also recorded on a daily basis other behavioral, experiential, and situational aspects of their lives. In the postmeasurement session respondents completed another questionnaire and were informed about the purpose of the study.

Data obtained directly from the respondents at these three stages were complemented by information derived from two external sources: First, information about the habitual mineral water intake of other persons, if any, living together with a respondent in the same household and being at least 14 years old were obtained as well as their behavioral belief strengths and outcome evaluations regarding mineral water intake. Data supplied by these persons were assigned to the respondent's data file entry at the analysis stage. Second, weather information (i.e., minimum and maximum air temperatures, hours of sunshine, volume of rainfall, barometric pressure, air humidity, and wind speed) was obtained throughout the whole fieldwork time on a daily basis from the weather station at Hamburg Airport (available from http://www.wetteronline.de). These data were matched with the data supplied by participants who reported on the same days and were aggregated across the 7-day reporting periods.

Participants

The only criteria respondents had to meet to be eligible for participation in the study were (a) being enrolled as a student in a university and (b) not having participated in a survey on beverage consumption within the past 12 months. The idea behind this latter requirement was to exclude persons who had been interviewed previously in the qualitative elicitation study.

The vast majority of respondents were recruited via small placards that were pinned to general notice boards in different buildings of the University of Hamburg; only a very small number was personally asked to take part by the present author. The sample can therefore mainly be characterized as a volunteer sample although, as some respondents were directly asked for their participation, it also followed the strategy of opportunity sampling (for a discussion see Miles, 2001, p. 79). As no funds had been raised to support the execution of this study, it needed to be run as a low-budget project, financed exclusively by the private means of the present author. This was the main reason why students were selected as the target group. Students of psychology, who were intended to make up ca 50% of the sample, received academic credit for their participation in the study; other students were paid an incentive (EUR 26.--) at the end of the postmeasurement session.

The raw sample consisted of $N = 194$ respondents who went through all three stages of the quantitative study and completed all materials. Although using mineral water regularly could have been a reasonable condition respondents had to meet too in order to become eligible, it was not made a prerequisite for their participation, because it was feared that this might have caused respondents to give biased answers to the questionnaires or to make wrong entries in the diary or even to change their actual intake behavior just for the purpose of becoming eligible. In a first step, therefore, habitual nonusers of mineral water were to be identified and excluded from the raw sample. A respondent's answer to Question H3 (see Appendix B1) indicating that he or she would ingest mineral water under no circumstances whatsoever was considered as the hardest criterion for this purpose (true for $n = 2$). Also, respondents saying that, generally, they drank mineral water almost never (Question H4), or had not drunk it at all in the past 4 weeks (Question H5), and had not drunk it in the past 7 days (Questions H6 and H7) were excluded (true for $n = 10$). These 12 respondents also neither intended to drink mineral water during the data collection period (Questions H10, H11, and H12) nor recorded actual intake during that period. They were considered as habitual nonusers of mineral water.

Furthermore, when a regression analysis of volume of reported mineral water intake on volume of intended mineral water intake was performed on the remaining $N = 182$ participants, three cases were identified as severe outliers (standardized residuals $z >= \pm 3.1$) and were eliminated from the sample too. Thus, the remaining effective sample size for subsequent analyses was $N = 179$. Table 4 provides an overview of basic demographic and anthropometric characteristics of the sample.

Table 4

Characteristics of Participants

Characteristic		n	%
Sex			
Female		133	74
Male		46	26
Age (years)			
19 - 20		20	11
21 - 25		80	45
26 - 30		41	23
31 - 35		18	10
36 - 40		14	8
> 40		6	3
University / college			
University of Hamburg		167	93
Other university / college		12	7
Major subject			
Psychology		79	44
Other major		100	56
Type of household: Respondent is living ...			
in his or her parents' household		17	10
alone (single-person household)		41	23
together with a partner (two-person household)		41	23
together with a partner and own children (family)		13	7
alone with own children (single-parent household)		5	3
in an apartment-sharing community		55	31
in another type of household / no answer		7	4
Body Mass Index (BMI; body weight [kg] / height [m^2])[a]			
< 18.5	(underweight)[b]	16	9
18.5 - 24.9	(normal weight)[b]	140	78
25.0 - 29.9	(overweight)[b]	17	9
>= 30	(obesity)[b]	6	3

Note. N = 179. For question wordings see Appendix B3, Questions N22, N23, N29, N30, N31. [a]BMI was calculated from Questions N25 and N26. [b]Classification of BMI according to WHO guidelines (see, e.g., Ogden, 2003, p. 133; RKI, 2005a, p. 8; see also chap. 2.2).

As can be seen, the majority of respondents were women, were enrolled in the University of Hamburg, and had a normal body weight; nearly half of the respondents majored in psychology. Respondents lived in a wide range of types of households when they participated in the study, which reflects the different stages of life course they were in: Some of them were still living together with their families of origin, others were apparently in the transition phase between their family of origin and the foundation of a family of their own, reflected in single- and two-person households and apartment-sharing communities, while some others had already started their own families. This finding is in line with the wide distribution of respondents' age (range 19 to 58 years).

Materials

In the premeasurement and briefing session, the premeasurement questionnaire was administered (see Appendix B1). It comprised three sections: (a) an introductory text informing the participants about the procedure of the study, followed by some introductory questions; (b) one sheet of the beverage diary to be completed from memory for the day preceding the premeasurement session in order to give participants the opportunity to practice completion of the diary and to clarify any emerging queries related to it; and (c) an extensive questionnaire for ascertaining the trait-like dispositions and all predictors of the TPB, TRA, and PWM (for details see below).

According to their answers to the introductory questions (see Appendix B1, Questions V1 to V4), respondents were given (a) an appropriate number of questionnaires for other persons who were living in their households and who were aged 14 or above, if any (see Appendix B4), and (b) a measuring cup to determine the volume of the cups, mugs, glasses, jars, and so forth that they usually used in their households, provided that they had not said in Question V3 that there was a measuring cup or another appropriate dosing device for fluids available in their households.

The questionnaire for other persons living together with a respondent in his or her household comprised an introductory text and questions about those persons' habitual beverage and mineral water intake, followed by the same items as in the premeasurement questionnaire for the respondents themselves to assess those persons' behavioral belief strengths and outcome evaluations regarding mineral water intake (see Appendix B1, Questions H23 and H24, and Appendix B4, Questions M7 and M8); the questionnaire ended with demographic and other questions. The measuring cup that was to be used during the data collection period was only given to respondents who did not have one at home. It was a standard kitchen device made of translucent plastic with a total volume of 150 milliliters, scaled in 10-ml intervals; it was bought from a local department store. Respondents who took a measuring cup home with them were asked to return it when they came back to the postmeasurement session.

Next in the premeasurement questionnaire was the diary sheet for training purposes (see Appendix B1). On top of it, respondents had to mark the weekday and date of the day for which the sheet was completed, which in this case was the day preceding the premeasurement session. At the center of the diary was a matrix consisting of 26 rows with precoded names of beverages or types of beverages including mineral and tap water, but no other water formats (cf. chap. 1.3), and 6 columns, 1 column for each of the 6 intervals that a day was divided into. Intervals ranged from 05:00 a.m. to 09:00 a.m., 09:00 a.m. to 12:00 p.m., 12:00 p.m. to 02:00 p.m., 02:00 p.m. to 05:00 p.m., 05:00 p.m. to 08:00 p.m., and 08:00 p.m. to 05:00 a.m., according to what was assumed a priori to be a sensible time pattern for students who structure their days and organize their meals and other occasions where beverages are typically drunk. Thus, a day of the data collection period started and ended at 05:00 a.m., not at midnight. The 26 rows were supplemented by 3 others at the bottom of the matrix where participants could insert the names of any beverages that they had ingested on that particular day and that they were unable to classify into one of the other 26 precoded beverage types. Respondents had to insert the total volume of any beverage they drank within an interval in the corresponding cell of the matrix. If a beverage was not drunk within an interval, the cell was left blank.

Several other items and questions were printed on the lower half of the diary sheet (see Appendix B1), of which the following are of interest in this context: (a) an analogous scale spanning the 24 hours of the day ranging from 05:00 a.m. to 05:00 a.m., on which respondents had to indicate with a horizontal line the times they spent in their own households; the line was not to be drawn during times they spent out of their home; (b) questions about the total times, if any, respondents were engaged on that day in physical work or labor and in physical exercise; and (c) rating scales to ascertain global daily mood and global daily physical comfort. The structure and layout of the diary, in general, the categories of beverages and the lengths of the intervals per day, in particular, were guided by the beverage diary ("Trink-Tagebuch") employed by the Bundesverband der Deutschen Erfrischungsgetränke-Industrie in studies among the general population (e.g., Bundesverband der Deutschen Erfrischungsgetränke-Industrie, 1998, 2000; Henrichsmeier & Grothe, 1997; see also Sichert, Oltersdorf, Winzen, & Leitzmann, 1984).

Finally in the premeasurement session, respondents worked through the rest of the questionnaire at their own pace, where the majority of potential predictors of mineral water intake were ascertained (i.e., trait-like dispositions such as knowledge of the composition of mineral water and how it is manufactured; dietary restraint; variety-seeking tendency; food neophobia; attitude toward eating, that is, the importance of eating as measured with IEG scale 1; all predictors in the TPB, TRA, and PWM models; for details see chap. 2.2 and 2.3 and Appendix B1, Questions H1 to H38).

When participants left, they were given the 7-day beverage diary in A4 format together with recording instructions (see Appendix B2). The diary consisted of eight sheets stapled together, one for every day of the data collection period and an eighth one as a spare sheet in case they spoiled one of the others. The diary sheets were identical with the training sheet (see above), except that they did not refer to the day before the premeasurement session but to the present day of the data collection period. Respondents took the following items home with them for use during the data collection period: (a) the beverage diary with instructions; (b) two large brown envelopes, one in which the first half of the completed diary sheets were to be stored in and to be returned in the middle of the data collection period, and another one in which the rest of the completed sheets were to be stored in and to be returned at the postmeasurement session; (c) questionnaires for other persons, if any, in their households together with a corresponding number of small white envelopes for each of these other persons to store their questionnaires in after completion and for the respondents to bring them back to the postmeasurement session; and (d) a measuring cup, if necessary.

In the postmeasurement and debriefing session the postmeasurement questionnaire was administered (see Appendix B3). In the first section of this questionnaire, supplementary information about the data collection period was obtained that was intended to allow for a check-up on the quality of the data respondents had supplied (see Appendix B3, Questions N1a to N6 and N15 to N21). Afterwards, anthropometric and demographic characteristics were ascertained as well as details of respondents' SES (see Appendix B3, Questions N22 to N41).

Procedure

The quantitative main study was conducted between January and July 2002. Fieldwork time spanned nearly half a year, which is attributable only to practical aspects of recruiting participants and executing fieldwork. It would simply not have been feasible to make nearly 200 students congregate at the same time in the same place, administer the premeasurement questionnaire, instruct them in the use of the diary, answer all questions, induce commitment in them, and attend to them during the data collection period. Ideally, though, all respondents would have been briefed and debriefed simultaneously and would have recorded their beverage intake over the same 7-day period in order to rule out or to keep constant any intervening influences such as the weather, mass media reports on food related issues, promotion or advertising campaigns of the food industry, launches of new food products, and so forth.

Pre- and postmeasurement sessions were conducted by the present author in Hamburg, Germany, mostly in small groups of 4 to 8 respondents, who were invited to come to an examination room in the Department of Psychology, University of Hamburg.

In the premeasurement session respondents were informed about the objective of the study, which was explained to them as beverage consumption in everyday life with a focus on mineral water intake. They were told that they could withdraw their consent to take part in the project at any time if they so wished, even after they had run through all stages of the study and had completed all materials and without giving any reason. They were informed that, provided they had supplied a full set of completed materials, their withdrawal would have no influence on their receiving the incentive (i.e., academic credit or EUR 26.--). Respondents were not given any details at this stage, however, about the potential predictors of mineral water intake that were ascertained in the study and how these predictors were hypothesized to influence mineral water intake. Instead, they were informed about these issues at the end of the post-measurement session, though the depth of the information given then depended on how interested and knowledgeable the students were.

Furthermore, participants were assured that all information they gave was kept strictly confidential and that their data were to be processed and analyzed completely anonymously. This was achieved by keeping respondents' names and telephone numbers together with an individually assigned code number separate from the materials they completed; all materials were marked only by the code numbers and so were the data in the electronic data files. After all completed materials had been checked, coded, and punched, and after any ambiguities had been clarified with the respondents, the list with the names, telephone and code numbers was destroyed. At no times were respondents' addresses or birthdates registered.

Next in the premeasurement session, the premeasurement questionnaire was administered (see above) and along with it the whole procedure of the study was explained. First, in cases where respondents were living together with at least one other person in the same household aged 14 or above, they were asked to take home and hand over a questionnaire to each of them and ask them to complete it. This questionnaire was specifically designed to ascertain additional information from these persons (see above). Ethical aspects were given consideration here too: The other persons were informed in the introductory text on the front page of their questionnaire that they would be participating fully voluntarily and that their data were to be processed and analyzed completely anonymously (see Appendix B4). If more than one person aged 14 or above was living together with a participant, every one of them was supplied with a separate questionnaire. Those of the persons who were willing to participate in the study completed their questionnaires, put them in the small white envelopes that were supplied together with the questionnaires, sealed them up if they so wished, and returned them to the participants, who finally brought them back to the postmeasurement session. If more than one person within the same respondent's household completed a questionnaire, their data were averaged at the analysis stage and assigned to that respondent's data as mean scores in order to arrive at estimates of average social influence within a household.

Any persons aged 14 or above who were living together with a respondent were excluded at the analysis stage if they indicated on their questionnaire that they had participated in a survey on beverage consumption within the past 12 months or that they were currently participating in the same study as well or were intending to do so. The idea behind these restrictions was (a) to exclude any persons who had been interviewed previously or had been engaged as interviewers in the qualitative elicitation study and (b) to make sure that no person took part in the study twice, once as a primary respondent and again as a person living in the same household together with another primary respondent.

Second, it was pointed out to respondents that the beverage diary needed to be filled in as precisely as possible, in terms of both quality and quantity of the beverages ingested. As regards the quantity of intake, it was made sure that respondents either had a measuring cup in their homes, or they were lent a 150-ml measuring cup for the time they took part in the study (see above). Participants were encouraged to use a measuring device and determine the volumes of all mugs, jars, cups, glasses, and so forth they typically used in their homes or workplaces before they started recording intake. They were not required to actually measure the volume of every single portion of a beverage they ingested; the intention was simply to make them aware of how many milliliters could be poured into a drinking vessel and thus to make them give informed judgments about any volume they subsequently drank. The necessity for addressing this point prior to recording intake became all too obvious, when during the briefing some students asked how much a milliliter was. Respondents were also referred to the fact that (a) when drinking industrially bottled beverages, their contents could always be found on the pack, and (b) when buying beverages in gastronomy, their volume could often be found out by looking for a line measure on the glass or by consulting the menu. In addition, typical volumes of usual drinking vessels were explicitly given as a reference in the instructions supplied with the beverage diary (see Appendix B2).

To ensure that all respondents were equally aware of the 26 precoded names of beverages or types of beverages printed on the diary before they started to record the beverages they drank, the list of names was read out to them *but not explained* in the premeasurement session. If respondents had queries regarding this list that did not require a definition of any of the beverages, then they were clarified. If respondents explicitly asked for a definition, however, they were referred to their own knowledge and implicit classification system. For example, if a participant was unsure as to whether to record white coffee, half of which consisted of milk and half of coffee ("Milchkaffee"), in the category coffee ("Kaffee") or as a drink made of milk ("Milchgetränke"), he or she was told to record it in the category which was most suitable *from his or her idiosyncratic point of view*. If the participant was unable to assign a beverage to any of the 26 precoded categories, he or she was referred to the 3 blank rows at the bottom of the matrix where the names and volumes of any beverages were to be inserted that could not be classified into one of the existing categories.

This way of introducing the diary and how it was to be used needs to be justified, as it was clearly a crucial point for the validity of the reported measurements of intake and thus for the outcome of the whole study, particularly because the list included only mineral water and tap water but no other water formats.

As was explained earlier in this text (see chap. 1.3), there are five different, legally defined formats of potable water available in Germany: (a) drinking water from the domestic tap ("Trinkwasser"), (b) mineral water ("Natürliches Mineralwasser"), (c) spring water ("Quellwasser"), (d) table water ("Tafelwasser"), and (e) water for medicinal purposes ("Heilwasser"); and it was further explicated that consumers appear to use their laymen's beliefs to construct own classification systems for potable waters rather than referring to these legal categories. In consequence, consumers are acquainted with the notions of mineral and tap water and also with that of water for medicinal purposes, though only very few persons actually drink water for medicinal purposes, but they do not appear to be very knowledgeable about their physical, chemical, or legal characteristics. Table water is perceived by many consumers as some sort of a premium mineral water and not as a category of its own, and spring water is practically unknown to consumers, a notion that tends to induce confusion (Wüstefeld-Würfel, 1999). None of the five water formats, however, is as prominent as mineral water, which is by far the most important of them all in terms of per-capita consumption; its volume accounts for ca 93% of the total volume of all prepacked water consumed in Germany. And water coming straight from the domestic tap is not assumed to be ingested in high quantities either (cf. chap. 1.3).

Now, when conducting research into mineral water intake on the basis of a diary kept in naturalistic settings, there were two basic approaches viable for briefing respondents: either all respondents were given the same kind of information of any breadth and depth about potable water and other beverages or they were all left where they were with the concepts, notions, perceptions, beliefs, and attitudes related to potable water and other beverages which they possessed before they came to the premeasurement session. The first option was soon ruled out in the set-up phase of the study. Due to economic reasons, respondents needed to be briefed in groups, not separately. These groups were assumed to vary in terms of knowledge of and attitudes and consumption habits related to mineral water and other water formats and beverages. It was feared that these differences would trigger different questions and cause different courses of discussions during the briefing process that would ultimately leave the members of different groups at different levels of knowledge, even if the intention had been to give them all the same kind of information. Furthermore, once respondents had been given information on such seemingly trivial matters as water formats, this information was very likely not only to brighten them up, but it may have also contradicted long-standing beliefs and convictions so that some of the participants may have felt more confused than informed afterwards. All of these potential effects were suspected to influence recording of mineral water intake and intake behavior itself in a way that could not be controlled during fieldwork time. Therefore, the decision was made to make participants record any beverages as mineral water that they believed to be mineral water, even if it was aerated tap water or something else.

If, however, a question about water formats was raised and if referring participants to their own classification systems did not satisfy them, that is, if they obviously suspected that there was more to the world of water formats than mineral and tap water and that they were not told the full story of it, it was emphasized that it was vital for the study that they referred to the same, their idiosyncratic, notion of mineral water at all times when they completed the study's materials. They were asked to think about their concept of mineral water when completing the premeasurement questionnaire *and* when recording beverage intake during the data collection period in order to comply with the principle of compatibility (see chap. 2.2 and 2.3). Also, all respondents were told not to change their normal drinking behavior while participating in the study.

Table water, spring water, and water for medicinal purposes were not put on the list of beverages because omitting them was assumed to be less likely to generate confusion than adding them. Tap water was included despite its low relevance for fluid supply because everybody knew that it existed and that there was a basic difference in format between freely flowing water from the domestic tap and bottled water bought in the shops.

Respondents were also informed that the idea guiding the study was not to report fluid or nutrient supply, but to report *drinking behavior*. They were, therefore, instructed not to report intake of mineral or tap water when it was used for nondrinking purposes like, for instance, cooking and *eating* a soup. When they were *drinking* a soup made of any water from a cup, instead of eating it with a spoon, they were told to record this as ingesting a drink. They were also told to report the usage of mineral water as mineral water only when it was drunk straight from the pack and of tap water as tap water only when it was drunk straight from the tap; when they used water for making homemade drinks like hot tea or coffee, they were instructed to record this as intake of tea or coffee, not of water. Quite similarly, the intake of sodas, when their main constituent was mineral water, was to be recorded as sodas ("Limonaden / Brausen"), not as mineral water.

Next in the premeasurement session, respondents were instructed in how to complete the lower half of the diary sheets, in particular how to handle the analogous scale spanning the 24 hours of the day ranging from 05:00 a.m. to 05:00 a.m., on which they had to indicate the times they spent in their own households. It was pointed out to them that they were in no way restricted in their mobility during the data collection period. Respondents were informed about how to record the total times, if any, that they were engaged in physical work or labor like physically demanding occupational activities or activities related to the household or garden and in physical exercise including the time they may have spent in a sauna. It was left up to them to decide whether to record times of strenuous transportation (like walking, bicycling) and the like, if any, as labor or as physical exercise, depending on how they primarily experienced these activities. Finally, respondents' attention was drawn to the rating scales for global daily mood and physical comfort.

Ratings of mood and physical comfort, the total time respondents were engaged in physical work or labor or in physical exercise as well as times respondents spent at their homes were aggregated across the 7 days of the data collection period at the analysis stage too in order to obtain intraindividual measures that match the intake data in level of aggregation.

Participants were instructed to record the total volumes of ingested beverages on the diary sheets at the end of the predefined intervals. If they were unable to do so, they were told to do it as soon as possible afterwards. The times spent at their homes or with physical work or labor or with physical exercise should be inserted by the end of the day; also, respondents were recommended to assess their global daily mood and physical comfort by that time of the day. They were asked never to make any entries on the diary sheets in advance but always with hindsight.

They were further told that the data collection period was to start the day immediately following the premeasurement session and that it spanned exactly 7 days. They were advised to carry the diary with them, if they could, so that they were able to make their entries independent of their whereabouts. The eighth diary sheet was explained as being a spare sheet. When a day was over, respondents were obliged to remove that day's sheet from the diary and store it in the first of the large brown envelopes. This measure was intended to hamper transcribing entries from earlier completed sheets. For the same reason, respondents had to return all completed diary sheets in the first envelope by the middle of the data collection period either by sending them to the present author's home address or by bringing them to the Department of Psychology. The remaining sheets were to be stored in the second envelope and to be returned in the postmeasurement session. Respondents were also supplied with a telephone number to call in case they had any queries or ran into difficulties during the data collection period. Finally, time and date for a postmeasurement session were arranged for every respondent; this session was intended to take place as soon as possible after the data collection period was over. Respondents wrote these details down on their instruction sheet that they took home with them.

Next, for training purposes, the diary sheet for the day preceding the premeasurement session (see above) was to be completed. While it was being completed, any emerging queries were discussed and clarified. The premeasurement session ended with respondents completing the rest of the premeasurement questionnaire where the trait-like dispositions and all predictors of the TPB, TRA, and PWM were ascertained (see above).

The premeasurement session took place on a Monday for 16% of the respondents in the final sample ($N = 179$), on a Tuesday for 21%, on a Wednesday for 18%, on a Thursday for 44%, and on a Friday for 1%. Hence, conditions under which respondents recorded their day-to-day beverage intake were similar for practically all respondents insofar as they started on a weekday, not on a weekend day.

During the data collection period, respondents were left on their own except when they turned to the present author and asked for assistance. At the prearranged date and time respondents returned to the examination room in the Department of Psychology for the postmeasurement session. They brought back all the remaining diary sheets, completed and blank, and any questionnaires from the persons they were living with and the measuring cup if they had received one. A postmeasurement questionnaire (see above) was then given to the respondents to complete it at their own pace, while their sets of diary sheets were checked for potential ambiguities. Finally, the incentives were paid, and respondents were debriefed and informed about the purpose of the study, and any questions regarding the study that occurred to the respondents were answered.

All completed materials were checked, coded, punched, and processed by the present author. During this process, any beverages that were recorded in one of the 3 supplementary rows on the diary, which respondents were instructed to use in cases where they were unable to classify a beverage into one of the precoded categories, were checked to see if they could unequivocally be categorized from the researcher's point of view into one of the 26 precoded alternatives in order to keep the number of entries and volumes ingested in this open-ended category to a minimum. For instance, mulled wine or Martini were recoded as wine ("Wein / Sekt"; see Appendix B2), tschai or tea with milk were recoded as tea ("Schwarzer / grüner Tee"), Bitter Lemon as soda ("Limonaden / Brausen"), buttermilk as a drink made from milk ("Milchgetränke"). Any remaining ambiguities in all completed materials were clarified during this process by checking them with the respondents.

A group of 8 respondents who were the first to take part in the quantitative main study were considered as a pretest group. After having completed all materials, they were informally questioned about their experiences while participating in the study; in particular, they were asked for apparent flaws in the procedure, any misleading formulations, requirements that were impossible to meet, their suggestions for improvement, and so forth. They did not mention any severe criticism. Even when prompted, they did not complain about the time it took to complete all the materials in comparison to the incentive they received. In consequence, it was decided (a) to consider their data as fully usable for subsequent analyses and (b) to extend the premeasurement questionnaire by appending Question H38 at the very end of it (see Appendix B1), which was missing on the questionnaires of the pretest group. This question ascertained items of the FNS and IEG scale 1, which had not been considered that important at the outset of the study. Extending the premeasurement questionnaire by adding one question at the end of it, which was similar to the preceding questions in structure, was not suspected to render data obtained from the pretest group and from all subsequent respondents incompatible.

5.2 Results I: Person-Related Determinants of Mineral Water Intake

Data Quality

The first thing to do at the analysis stage was to check the quality of the data respondents had supplied and to see whether there were indications of any flaws or failures in the procedure that might have compromised the objective of the study. In terms of *overall acceptance* of their participation in the study, 91% of the respondents said in the postmeasurement session that they would basically be prepared to take part in the study again (for question wording see Appendix B3, Question N6). Also, there were no drop-outs, all respondents who went through the premeasurement session did complete all subsequent materials including a full set of diary sheets for 7 consecutive days; and 94% of them complied with the requirement to hand in the first completed diary sheets by the middle of the data collection period.

Respondents were also asked in the postmeasurement session whether, in their opinion, the data collection period had been representative of their everyday life, that is, whether the 7 days had covered a week that was typical for them (see Appendix B3, Question N1a), a question addressing *ecological validity* and *representativeness*; three quarters (76%) answered in the positive. Among those who denied the question (n = 43), 11 respondents said that they had been going out more often or that there had been more celebrations or parties they went to than in a typical week, 6 said they were ill, some said that they took exercise less often than in a typical week or that the data collection period was in the semester break (n = 5 each), while some said they spent unusually much or little time, respectively, at their homes (n = 4 each).

Question N3a (see Appendix B3) asked whether respondents believed that their beverage intake behavior had changed during the data collection period due to the process of self-monitoring, a question addressing *reactivity*; 87% answered in the negative or said they did not know. Among those who agreed (n = 23), 7 respondents said that they had drunk beverages in a way that made it easier for them to record exact volumes (e.g., finished a drink off instead of pouring the leftover away), 7 said that they had tried and drunk more volume than usual, and 5 said that they had been simply more aware of their drinking behavior.

In a similar vein, Question N2a (see Appendix B3) asked whether respondents believed that they had fed themselves during the data collection period in the same way as they probably would have done had they not participated in the study. This question aimed at perceived changes in nutrition behavior during the data collection period, that is, in the dependent variables, regardless of whether these changes were attributable to insufficient ecological validity or representativeness or to reactivity or to some other cause. The vast majority of respondents (92%) answered in the positive indicating that there was no perceived effect of their participating in the study on their food-related behaviors during the 7-day recording period.

When setting up the study, it was assumed that respondents would not in all instances be able to record the volumes of the beverages they had ingested in a predefined interval at the end of that very interval, as they were supposed to do. Delayed recordings, however, might have caused or increased *retrospection bias* in the data. Question N4 (see Appendix B3) targeted this potential bias by asking respondents whether they had been able to fill out the diary whenever an interval was over; 85% of the participants said that they had been able to do so either most of the times or even nearly always.

Question N5 (see Appendix B3) asked respondents whether they had actually determined the volumes of the drinking vessels they usually used by means of a measuring device before they started recording intake, thus addressing the question of *reliability* of reported intake volumes; 82% of the respondents clearly answered yes, 15% said they partly did.

Another aspect of data quality is related to the *comparability of data between individuals*. As was already made clear above, respondents did not simultaneously take part in the study, which may have caused intervening influences *external* to the study's procedure such as the weather, advertising campaigns of the food industry, and so forth to impact on information obtained from different persons at different times. But there may also have been differences in the testing procedure itself that may have *internally* produced differences between the information obtained from different persons. In particular, there may have been relevant differences in time lags between the three stages that every respondent went through.

First, there should have been no time lag between the premeasurement session and the commencement of the data collection period: The first day of that period should have been the day immediately following the premeasurement session. Any delay would have been suboptimal because of two reasons: (a) The principle of compatibility would have been compromised because the predictors of the TPB, TRA, and PWM ascertained in the premeasurement session were explicitly referring to the *next* 7 days, not to an arbitrary 7-day period in the future; and (b) if a respondent did not start the day after the premeasurement session, he or she may have done so because starting on another day was more convenient for him or her, in which case ecological validity and representativeness of the data might have been jeopardized. However, it turned out that only 5 respondents actually did not start reporting the day after the premeasurement session, one of whom started 3 days later, and another one started 1 month later; this latter person claimed in the postmeasurement session that the postponement of the data collection period was only due to a misunderstanding of the instructions. Furthermore, 3 respondents started too early on the day the premeasurement session took place; a behavior that could also be traced down to misunderstandings of the instructions.

Second, the postmeasurement session was intended to be held as soon as possible after a respondent's data collection period was over, which of course depended on respondents' time tables and the availability of the examination room. On average, the time lag between the last day of the data collection period and the postmeasurement session was about 1 week ($M = 6.6$ days, $SD = 6.6$, range 1 to 28 days).

Finally, potential *nonresponse bias* needed to be checked among the persons who were living together with a respondent in his or her household and who received a special questionnaire for completion. A total of 84 respondents took one or more questionnaires for these other persons home with them, and every one of them returned at least one of the questionnaires ($n = 69$ participants returned 1 questionnaire, $n = 12$ returned 2, and $n = 3$ returned 3). Thus, the response rate in relation to the respondents who took questionnaires home with them was 100%.

Obviously, there were some deviations in most of the above-listed criteria from what can be regarded as an ideal procedure of the study, and there were some respondents who did not fully comply with the instructions. But the question must be raised as to the extent to which a sample of respondents can be expected to comply with all detailed instructions while taking part in a naturalistic study spanning many days if not weeks, and to which any disturbances of the flow of a study like the present can reasonably be avoided. It was concluded that the irregularities observed in the present study were within the frame of what is usually found when naturalistic studies like this are conducted and that they would only be of minor or negligible influence, if any, on the outcome of the study. After all, it was decided to continue data analyses with the effective sample size of 179 participants.

Dependent Variables

When looking at the intake of the whole sample across the 7-day period, it was found that nearly 3,000,000 ml of beverages were ingested; this amounts to 2,368 ml on average per person per day. Water contributed the biggest share of all beverages to total intake (mineral water 24%, tap water 12%) followed by coffee (11%), fruit juice and water mix (8%), pure fruit juice (7%), tea and herbal tea (7% each), and beer (6%).

Mineral water intake was not recorded over the 7-day period by 9% of the respondents in the final sample; yet, these respondents did not fulfill the above-explained and applied criteria for the operational definition of habitual nonusage of mineral water and were thus treated as users too. Table 5 gives an overview of the interindividual distributions of within-subject sums of intake volumes for the most relevant beverages (i.e., beverages with *Mdn*, Q_1, or $Q_3 > 0$); all beverages listed in Table 5 accounted for 91% of the sample's total intake volume.

Table 5

Volumes of Ingested Beverages (ml), Intraindividually Aggregated Over 7 Days

Type of Beverage	Sum	*Mdn*	Q_1[a]	Q_3[b]
Mineral water ("Mineralwasser")	713,283	2,900	650	5,950
Coffee ("Kaffee")	323,620	1,200	0	3,100
Fruit juice ("Fruchtsaftgetränke / Fruchtsäfte / -nektare")	202,958	750	0	1,690
Tap water ("Leitungswasser")	346,080	340	0	2,450
Fruit juice and water mix ("Fruchtschorlen")	226,680	300	0	1,500
Herbal tea ("Kräuter- / Früchtetee")	193,008	250	0	1,525
Tea ("Schwarzer / grüner Tee")	193,250	225	0	1,200
Wine / Sparkling wine ("Wein / Sekt")	81,810	200	0	650
Beer ("Bier")	175,129	150	0	1,250
Drinks made of milk ("Milchgetränke")	75,594	50	0	500
Cola beverages ("Cola-Getränke")	64,532	0	0	400
Milk ("Trinkmilch")	47,155	0	0	230
Soda ("Limonaden / Brausen")	43,088	0	0	200
All beverages[c]	2,967,126	15,800	12,320	19,700

Note. $N = 179$. All beverages not shown in the table are characterized by *Mdn*, Q_1, and $Q_3 = 0$.
[a]Lower quartile. [b]Upper quartile. [c]Including beverages not shown.

All research questions that this study is supposed to answer (except Question 9, see chap. 3) refer to three dependent variables: (a) volume of mineral water intake; (b) volume of total beverage intake; or (c) a participant's relevant set of beverages, which is the number of different beverages that he or she has chosen to drink over the data collection period. While great care had been taken to obtain reliable, unbiased, and ratio-scaled primary measures of intake, some doubts may be raised as to the adequacy of the raw scores of volume of mineral water and total beverage intake for representing interindividual differences in intake. The absolute quantity of water in a person's body, any loss of which needs to be replenished (see chap. 1.3), does not only depend on age, sex, and the proportion of body fat and muscles, but it also varies substantially along with differences in individuals' body weight.

It was hypothesized, therefore, that the ratios of volume of both total beverage intake and mineral water intake to body weight were measures superior to the corresponding raw scores. Also, the ratio of volume of mineral water intake to total beverage intake was supposed to deliver relevant information. This latter ratio reflects the relative share of fulfillment of drinking needs accomplished by mineral water; in other words, while individuals may be different from each other in terms of the *absolute* volumes of mineral water they ingest, they may be equal in terms of the *relative share* that mineral water contributes to their total beverage intake, and vice versa.

In a first step, between-subject distributions of these potential dependent variables, which were all based on scores that had been intraindividually aggregated across the data collection period, needed to be examined (see Table 6).

Table 6

Potential Dependent Variables

Variable	*M*	*SD*	Skewness[a]	Kurtosis[b]
Mineral water intake (raw scores; ml)	3,985	4,120	1.55	2.72
Mineral water intake (raw scores; ml) divided by body weight	62	64	1.59	3.32
Total beverage intake (raw scores; ml)	16,576	6,189	1.05	1.85
Total beverage intake (raw scores; ml) divided by body weight	259	104	1.40	2.80
Ratio of mineral water intake to total beverage intake (based on raw scores)	0.23	0.20	0.86	0.37
Relevant set (number of beverages used)	9.28	2.83	0.10	-0.32

Note. $N = 179$.

[a]$SE = 0.18$. [b]$SE = 0.36$.

As can be seen from Table 6, all distributions except that of the relevant set differ significantly ($p < .05$) from normal, since the values of skewness, and the values of kurtosis for four measures too, are greater than twice their standard errors. Though it may be argued that absolute values of skewness less than 1 should not cause major problems in subsequent calculations, that absolute values between 1 and 2 might be "probably OK" (Miles & Shevlin, 2001, p. 74), and that "underestimates of variance associated with positive kurtosis ... disappear with samples of 100 or more cases; [while] with negative kurtosis, underestimation of variance disappears with samples of 200 or more" (Tabachnick & Fidell, 2001, pp. 74-75), preference was given here to transforming data prior to further analyses in order to improve distribution parameters of the dependent variables. Given moderate positive skewness, Tabachnick and Fidell (2001, p. 83; see also Cohen, Cohen, West, & Aiken, 2003, pp. 246-247; Di Natale & Saba, 1997) recommend square-root transformation of the original scores. This was applied to all variables, except to the relevant set; prior to transformation, raw scores of mineral water and total beverage intake were rescaled from milliliters to liters. Results are presented in Table 7.

Table 7

Potential Dependent Variables, Square-Root Transformed

Variable	*M*	*SD*	Skewness[a]	Kurtosis[b]
Mineral water intake (rescaled scores; L)	1.69	1.06	0.27	-0.47
Mineral water intake (raw scores; ml) divided by body weight	6.66	4.20	0.27	-0.48
Total beverage intake (rescaled scores; L)	4.00	0.74	0.40	0.56
Total beverage intake (raw scores; ml) divided by body weight	15.79	3.05	0.73	1.00
Ratio of mineral water intake to total beverage intake (based on raw scores)	0.41	0.24	-0.15	-0.83

Note. $N = 179$.
[a]$SE = 0.18$. [b]$SE = 0.36$.

After transformation, all skewness and kurtosis values have clearly improved, except the kurtosis value of the ratio of mineral water intake to total beverage intake, but the magnitude of its absolute value still does not indicate severe deviation from normal.

Correlation coefficients between the five original measures and their respective square-root transformed counterparts ranged from r = .94 to r = .99; the correlation between square-root transformed mineral water intake and the transformed ratio of mineral water intake to body weight was r = .99, while the respective correlation between transformed total beverage intake and its transformed ratio to body weight was r = .88. The magnitude of these coefficients implies that little, if any, information is lost, neither due to square-root transformations nor by taking body weight into account. Also, the correlation between square-root transformed mineral water intake and the square-root transformed ratio of mineral water intake to total beverage intake was r = .95 (for intercorrelations of all potential dependent variables see Appendix D, Table D1). Due to the relatively high correlations between the transformed intake volumes and the transformed ratios to body weight and to total beverage intake, respectively, it was decided to use scores for any subsequent calculations that were as close as possible to the originally obtained data: (a) square-root transformed volume of mineral water intake, (b) square-root transformed volume of total beverage intake, and (c) the untransformed number of beverages used (i.e., the relevant set).

Item Analyses of Independent Variables

Research Questions 1, 3, and 4 (see chap. 3) are concerned with person-related predictors that were measured by multi-item aggregates which had not been available as published and commercially distributed instruments (i.e., a test purporting to measure declarative knowledge about mineral water, the VARSEEK-scale, and the FNS). Therefore, preliminary item analyses for these three scales were run in order to establish their psychometric properties.

Knowledge Test

Inspired by Wüstefeld-Würfel's (1999, p. 188) attribute list, an ad hoc test consisting of nine items was created for use in this study in order to tap respondents' knowledge of the composition of mineral water and of the process of its production and distribution. The items were statements that were intended to reflect the legal definition of mineral water (see chap. 1.3); they had a dichotomous response format (false vs. true), for example, "mineral water may contain up to 20% purified water that comes from lakes, reservoirs, or rivers" ("Mineralwasser darf bis zu 20% aufbereitetes Wasser aus Seen, Talsperren und Flüssen enthalten"), an item where *false* was the correct answer (for item wordings see Appendix B1, Question H31). All items had been content validated by IDM, who carry out public relations work on behalf of the association of German mineral water manufacturers (Verband Deutscher Mineralbrunnen e.V.), in order to determine whether an item made a claim that was in fact true or false.

When a participant responded correctly to an item, he or she was assigned one point; points were summated across the nine items to obtain a total score. Thus, knowledge test scores could range from 0 to 9 points with higher scores indicating more declarative knowledge of mineral water. Table 8 summarizes psychometric properties of the items; item numbering follows the sequence in which they appear on the questionnaire (see Appendix B1, Question H31).

Table 8

Psychometric Properties of the Items of the Knowledge Test

Item Number[a]	M[b]	SD	r_{it}[c]
1	.42	.49	.30
2	.80	.40	.04
3	.42	.49	.46
4	.25	.44	.32
5	.55	.50	.36
6	.49	.50	.45
7	.56	.50	.31
8	.31	.46	.31
9	.33	.47	.25

Note. $N = 179$. Dichotomous response format (coded 0 vs. 1).
[a]Items are numbered according to their appearance on the questionnaire (see Appendix B1, Question H31). [b]Item difficulty. [c]Corrected item-total correlation.

Due to its very low item-total correlation, item 2 ("Mineralwasser enthält immer Kohlensäure, die nach dem Einschenken in Bläschen aufsteigt") was eliminated from the final scale, whose scores, in consequence, had a range of merely 0 to 8 points. After item 2 had been eliminated, however, means of the remaining items were indicating medium-size to big item difficulties only, suggesting that the knowledge scale would tend to differentiate more between persons who are knowledgeable about mineral water than between persons with little knowledge. This may attenuate correlation coefficients between performance in the knowledge test and dependent variables such as mineral water intake. Given its dichotomous response format, the scale still showed acceptable internal consistency (Cronbach's α = .66).

Variety-Seeking Scale (VARSEEK-Scale)

Though the variety-seeking scale (VARSEEK-scale) had been published and discussed in journal articles before, it was not available in an established format when the present study was set up, and it appeared to have been used in a German translation only once before, namely by the present author (cf. chap. 2.2). Thus, psychometric properties of the eight items of the VARSEEK-scale were checked here too; results are summarized in Table 9. Item numbering follows the sequence in which the items appear on the questionnaire (see Appendix B1, Question H32; note, however, that at Question H32 the items of the VARSEEK-scale are interspersed with other items which are of no further interest here; for wordings of the items in both English and German better see Table 1, where items are listed in the same sequence). Response format was a 7-point rating scale that ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Thus, VARSEEK-scale scores could range from 8 to 56 points with higher scores indicating a higher degree of intrinsically motivated variety-seeking tendency in food choice.

Table 9

Psychometric Properties of the Items of the Variety-Seeking Scale (VARSEEK-Scale)

Item Number[a]	*M*	*SD*	r_{it}[b]
1	4.04	1.88	.70
2	4.96	1.71	.54
3	5.20	1.52	.77
4	5.45	1.57	.66
5	5.13	1.65	.73
6	5.01	1.62	.83
7 (R)	3.77	1.80	.63
8	4.66	1.54	.75

Note. $N = 179$. Response format: 7-point rating scale (ranging from 1 to 7). (R) = Reversed item.
[a]Items are numbered according to their appearance on the questionnaire (see Table 1; see also Appendix B1, Question H32). [b]Corrected item-total correlation.

With Cronbach's $\alpha = .91$, internal consistency for this scale was high and of the same magnitude as earlier applications in different languages (cf. chap. 2.2). Given the corrected item-total correlations shown in Table 9, no need was felt to reduce the number of items prior to further calculations. Means and standard deviations are reported merely as descriptive information, since earlier applications of the scale used different response formats (e.g., Riepe, 2003).

Food Neophobia Scale (FNS)

Like the VARSEEK-scale (see above), the FNS had not been published as a commercially distributed test; instead, it was published and discussed in journal articles only, and it did not appear to have been translated into German before (cf. chap. 2.2). Hence, psychometric properties of the ten items which the FNS consists of were considered worthwhile to be reported too; results are presented in Table 10. Item numbering again follows the sequence in which the items appear on the questionnaire (see Appendix B1, Question H38; but here FNS items are intermingled with items of the IEG scale 1; therefore, better see Table 2 in which items are shown in the same sequence, both in English and in German; note that sample size is reduced because Question H38 had not been administered in the pretest group; cf. chap. 5.1). Response format was again a 7-point rating scale that ranged from 1 (*strongly disagree*) to 7 (*strongly agree*); FNS scores could range from 10 to 70 points with higher scores indicating a higher degree of food neophobia.

Table 10

Psychometric Properties of the Items of the Food Neophobia Scale (FNS)

Item Number[a]	*M*	*SD*	r_{it}[b]
1 (R)	3.40	1.60	.53
2	2.68	1.43	.67
3	2.70	1.87	.46
4 (R)	2.19	1.20	.67
5	2.21	1.36	.67
6 (R)	2.60	1.61	.62
7	2.64	1.51	.54
8	4.51	1.69	.25
9 (R)	3.60	1.97	.48
10 (R)	3.01	1.78	.67

Note. $N = 171$. Response format: 7-point rating scale (ranging from 1 to 7). (R) = Reversed item.

[a]Items are numbered according to their appearance on the questionnaire (see Table 2; see also Appendix B1, Question H38). [b]Corrected item-total correlation.

Internal consistency of the German translation of the FNS (Cronbach's $\alpha = .84$) turned out to be of the same magnitude as values reported by other authors for the original English version and for translations of the scale into other languages (cf. chap. 2.2). Item 8 was retained in the scale despite its comparatively low item-total correlation in order to facilitate comparison of results with earlier applications of the FNS. Means and standard deviations are reported as descriptive information.

Scale Analyses of Independent Variables

Research Questions 1 to 8 (see chap. 3) address 11 potential determinants of mineral water or beverage intake, respectively, which are *person*-related: (a) knowledge of the composition of mineral water and how it is manufactured, (b) dietary restraint, (c) variety-seeking tendency, (d) food neophobia, (e) attitude toward eating or the importance of eating, (f) global daily mood, (g) global daily physical comfort, (h) SES of the respondent's family of origin, (i) personal net income, (j) time spent on physical work or labor like occupational activities or activities related to the household or garden, and (k) time spent on physical exercise.

Knowledge related to mineral water was measured with an ad hoc constructed test involving dichotomous items (range of summated item scores: 0 to 8 points, with higher scores indicating more knowledge), which was administered in the postmeasurement session (see above).

Dietary restraint was measured with the FEV scale 1, which included 21 items with different response formats (range of summated item scores: 0 to 21 points, persons scoring high are characterized by a distinctly restrained and to a large extent cognitively controlled eating behavior, while those scoring low tend to exhibit spontaneous unrestrained eating behavior). Variety-seeking tendency was measured by means of the VARSEEK-scale, which comprised 8 items that were appraised on 7-point rating scales (range of summated scores: 8 to 56 points, with higher scores indicating a higher degree of intrinsically motivated variety-seeking tendency in food choice). Food neophobia was quantified by the FNS, which encompassed 10 items that were also rated on 7-point rating scales (range of summated scores: 10 to 70 points, with higher scores indicating a higher degree of food neophobia). Attitude toward eating, that is, the importance of eating, was ascertained by means of the IEG scale 1, which also included 10 items that were to be rated on 7-point rating scales (so that scores could sum up again to values between 10 and 70 points, with higher scores indicating a more positive attitude towards eating, i.e., eating was judged as being more significant for a person's well-being and zest for life). These four scales were all administered in the premeasurement session (for details see above and chap. 2.2).

Both global daily mood and global daily physical comfort were ascertained once every day during the 7-day data collection period by means of 7-point rating scales that were administered at the bottom of the diary sheets (see above and chap. 2.2). The resulting seven measures for each of the two dimensions were aggregated across the 7 days and submitted to further analyses as intraindividual mean scores (range of averaged scores: 1 to 7 points, where higher scores meant that participants experienced on average more positive mood or physical comfort, respectively).

The SES of a respondent's family of origin had to be assessed directly by means of a 7-point rating scale with higher scores indicating higher perceived SES. Respondents also supplied information about their personal net income on a 9-point rating scale, where higher scores indicated the availability of more money. These two measures, which were obtained in the postmeasurement session, were the only person-related determinants in the present context that were based on single items which no kind of aggregation could be applied to (see above and chap. 2.2).

Finally, respondents were instructed to record the times for each of the 7 days of the data collection period that they spent on (a) physical work or labor like occupational activities or activities related to the household or garden and with (b) physical exercise including the time they may have spent in a sauna; total times per day were recorded as hours and minutes for each day at the bottom of the diary sheets (see above and chap. 2.2). At the analysis stage, minutes were converted into decimal fractions of an hour (e.g., 1 hour and 10 minutes was converted to 1.17 hours); hours were then aggregated across the 7 days and submitted to further analyses as intraindividual mean scores (i.e., the times a respondent spent on each of these activities on average per day of the data collection period).

An overview of distribution parameters of the measures obtained for these 11 predictors is given below (see Table 11).

Table 11

Independent Variables

Variable	*N*	*M*	*SD*	Skewness[a]	Kurtosis[b]
Knowledge test	179	3.33	2.10	0.19	-0.93
Dietary restraint (FEV scale 1)	179	5.61	4.61	1.06	0.42
Variety-seeking tendency (VARSEEK-scale)	179	38.23	10.32	-0.41	-0.48
Food neophobia (FNS)	171	29.55	10.44	0.70	0.56
Attitude toward eating (Importance of eating) IEG scale 1	171	53.81	11.02	-1.04	0.85
Global daily mood (rating scale)	179	5.16	0.71	-0.14	0.05
Global daily physical comfort (rating scale)	179	5.00	0.77	-0.26	0.54
SES of family of origin (rating scale)	177	4.25	0.94	-0.24	1.89
Participants' personal net income (rating scale)	177	3.40	1.50	1.10	1.76
Physical work or labor (total time; hrs / day)	179	0.84	1.29	2.27	5.37
Physical exercise (total time; hrs / day)	179	0.28	0.33	1.72	3.73

Note. FEV scale 1 = Scale 1 of the Fragebogen zum Eßverhalten, titled: "Cognitive control of eating behavior, restrained eating behavior"; VARSEEK-scale = Variety-seeking scale; FNS = Food Neophobia Scale; IEG scale 1 = Scale 1 of the Inventar zum Eßverhalten und Gewichtsproblemen; SES = Socioeconomic status.

[a]*SE* = 0.18 (except FNS and IEG scale 1: *SE* = .19). [b]*SE* = 0.36 (except FNS and IEG scale 1: *SE* = .37).

Inspection of the values of skewness and kurtosis in Table 11 shows that distributions of several variables, particularly those of the time-based measures, depart significantly ($p < .05$) from normality, as their absolute values are greater than twice their standard errors. While global daily mood and global daily physical comfort did not require any pretreatment of their scores at all, it was decided to leave the raw scores obtained for FEV scale 1, VARSEEK-scale, FNS, and IEG scale 1 unchanged too, because they were all instruments that other researchers had developed and published previously in scientific journals, albeit only the FEV and IEG were commercially available as psychometric tests. For the knowledge test and the scale for the self-assessment of the SES of the family of origin, no transformation could be found that resulted in a decrease in the absolute values of kurtosis while retaining the low skewness values; hence, the scores for these measures were also left unchanged. Scores for participants' personal net income and for the time-based measures were square-root transformed prior to any further calculations (see Table 12).

Table 12

Independent Variables, Square-Root Transformed

Variable	*N*	*M*	*SD*	Skewness[a]	Kurtosis[b]
Participants' personal net income (rating scale)	177	1.80	0.39	0.41	0.35
Physical work or labor (total time; hrs / day)	179	0.65	0.65	0.86	0.03
Physical exercise (total time; hrs / day)	179	0.40	0.35	0.26	-0.92

Note. [a]*SE* = 0.18. [b]*SE* = 0.36.

After transformation, distribution parameters of these three variables have clearly improved; correlation coefficients between the original measures and their respective square-root transformed counterparts ranged from $r = .93$ to $r = .99$. Therefore, only the transformed scores will be used in all subsequent calculations involving any of these three variables. For intercorrelations of all independent, person-related variables see Appendix D, Table D2.

Answers to Research Questions 1 to 8

A twofold strategy was pursued to answer all research questions addressing person-related determinants of mineral water intake (cf. chap. 3, Research Questions 1 to 8): (a) Scores of independent variables were correlated with those of relevant dependent variables using Pearson's product moment correlation, and (b) respondents scoring very low on a predictor (i.e., approximately at the level of the lower quartile Q_1 or below, called the *low group*) were tested for mean score differences in relevant dependent variables with respondents scoring very high on the same predictor (i.e., approximately at the level of the upper quartile Q_3 or above, called the *high group*) using t tests. In both cases, analyses were based on the effective sample size (i.e., N = 179) if not missing values caused lower base figures. An α level of .05 (two-tailed) was used for all statistical tests unless otherwise stated.

1. Knowledge

The first research question asked for a relationship between knowledge of the composition of mineral water and how it is manufactured and the volume of mineral water that is ingested. The correlation coefficient between achievement in the knowledge test and the square-root transformed volume of mineral water intake was not significant ($r = .12$, $p = .11$, $N = 179$); the low group (i.e., persons with little or no knowledge), however, consumed significantly less mineral water ($M = 1.43$, $SD = 0.89$, $n = 40$) than the high group (i.e., persons with much knowledge; $M = 2.03$, $SD = 1.10$, $n = 32$; $t = -2.57$, $p = .01$).

2. Dietary Restraint

The second question hypothesized that persons standing high on dietary restraint as measured with FEV scale 1 drink more mineral water, since it is free of calories. Yet, the correlation coefficient between FEV-scale-1 scores and the square-root transformed volume of mineral water intake was not significant (r = .12, p = .10, N = 179); but the low group (i.e., persons who tend to exhibit spontaneous unrestrained eating behavior that is controlled by appetite and satiety) consumed significantly less mineral water (M = 1.29, SD = 0.84, n = 30) than the high group (i.e., persons who are characterized by a distinctly restrained and to a large extent cognitively controlled eating behavior; M = 1.92, SD = 1.02, n = 51; t = -2.84, p = .01).

3. Variety-Seeking Tendency

Variety-seeking tendency as measured with the VARSEEK-scale was hypothesized to be related to beverage intake behavior in three ways: Respondents scoring high on this scale (i.e., who have a higher degree of intrinsically motivated variety-seeking tendency in food choice) were expected (a) to have a larger relevant set of different beverages; (b) therefore to have a higher volume of total beverage intake; but (c) to ingest less mineral water, because the potentially increased volume of total beverage intake due to a larger relevant set was not expected to be so high as to leave the absolute volume of each beverage ingested from the set unaffected, rather the absolute volume of each beverage was supposed to be slightly reduced.

Testing these hypotheses by way of correlation (N = 179) produced coefficients that were close to zero and not significant (for square-root transformed volume of mineral water intake: r = .01, p = .94; for square-root transformed volume of total beverage intake: r = .07, p = .33; and for the relevant set: r = .05, p = .55). A similar picture emerged when participants scoring very low on the VARSEEK-scale were compared with those scoring very high: All mean score differences were not significant (see Table 13). It is noteworthy, however, that all numeric differences between the groups were in the hypothesized directions.

Table 13

Group Differences for Beverage Intake Measures Between Persons With Low vs. High Variety-Seeking Tendency (VARSEEK-scale)

	Low[a]		High[b]			
Variable	*M*	*SD*	*M*	*SD*	*t*	*p*
Mineral water intake (rescaled scores; L) T	1.60	1.06	1.45	1.00	0.67	.51
Total beverage intake (rescaled scores; L) T	3.94	0.88	4.03	0.77	-0.49	.62
Relevant set (number of beverages used)	8.82	2.69	9.67	2.32	-1.56	.12

Note. VARSEEK-scale = Variety-seeking scale. T = Square-root transformed scores.
[a]$n = 45$. [b]$n = 42$.

4. Food Neophobia

The fourth research question addressed the potential relationship between food neophobia as measured with the FNS and (a) volume of mineral water intake and (b) the number of beverages in the relevant set. The correlation coefficient between FNS scores and the square-root transformed volume of mineral water intake was not significant ($r = -.01$, $p = .88$, $N = 171$) but the coefficient for the relevant set turned out to be so ($r = -.18$, $p = .02$, $N = 171$). These findings were corroborated by comparing respondents scoring low to those scoring high on the FNS scale: While there was no significant difference between these groups in terms of square-root transformed volume of mineral water intake (low group, i.e. persons with a low degree of food neophobia: $M = 1.57$, $SD = 0.96$, $n = 42$; high group, i.e. persons with a high degree of food neophobia: $M = 1.75$, $SD = 1.14$, $n = 45$; $t = 0.78$, $p = .44$), the high group had a significantly smaller number of beverages in their relevant set on average compared to the low group (low group: $M = 10.00$, $SD = 2.90$, $n = 42$; high group: $M = 8.27$, $SD =$

2.83, $n = 45$; $t = -2.82$, $p = .01$).

Quite in line with the theoretical concepts underlying the FNS and the VAR-SEEK-scale (cf. chap. 2), both scales were found to be negatively and substantially correlated ($r = -.76$, $p = .00$, $N = 171$; see Appendix D, Table D2).

5. Attitude Toward Eating / Importance of Eating

Fifth, is the attitude toward eating, that is, the importance of eating as measured with IEG scale 1 of the Eating Behavior and Weight Problems Inventory, associated with the square-root transformed volume of mineral water intake? Higher scores on IEG scale 1 indicate a more positive attitude towards eating, that is, eating is judged as being more significant for a person's well-being and zest for life. Both the correlation coefficient and the t test bore witness to the nonexistence of a relationship between both measures ($r = -.02$, $p = .75$, $N = 171$; low group: $M = 1.66$, $SD = 1.17$, $n = 41$; high group: $M = 1.63$, $SD = 1.10$, $n = 45$; $t = -0.12$, $p = .90$).

6. Mood and Physical Comfort

The sixth research question asked for a relationship between mood and physical comfort, respectively, and mineral water intake. Both mood and physical comfort were rated globally once every day during the data collection period; ratings that were intraindividually averaged across the 7 days were used at the data analysis stage with higher scores indicating more positive mood or physical comfort, respectively. Coefficients for the correlations of both measures with square-root transformed volume of mineral water intake (both $N = 179$) were not significantly different from zero (global daily mood: $r = .13$, $p = .09$; global daily physical comfort: $r = .12$, $p = .11$). Results for the t tests showed a similar picture for both global daily mood (low group: $M = 1.66$, $SD = 1.08$, $n = 38$; high group: $M = 2.11$, $SD = 1.01$, $n = 43$; $t = -1.92$, $p = .06$) and global daily physical comfort (low group: $M = 1.57$, $SD = 1.18$, $n = 41$; high group: $M = 1.94$, $SD = 0.99$, $n = 46$; $t = -1.60$, $p = .11$).

7. Socioeconomic Status (SES)

SES as the seventh potential person-related determinant of volume of mineral water intake was ascertained in two ways: (a) as the perceived SES of a respondent's family of origin (7-point rating scale with higher scores indicating higher perceived SES) and (b) as a respondent's current personal net income (square-root transformed, 9-point rating scale with higher scores indicating the availability of more money). Coefficients for the correlations of both measures with square-root transformed volume of mineral water intake (both $N = 177$) were not significant (SES of family of origin: $r = -.09$, $p = .21$; personal net income: $r = .03$, $p = .67$). Results for the t tests were also not significant (SES of family of origin: low group: $M = 1.81$, $SD = 1.20$, $n = 28$; high group: $M = 1.67$, $SD = 1.11$, $n = 70$; $t = 0.55$, $p = .58$; personal net income: low group: $M = 1.68$, $SD = 1.12$, $n = 53$; high group: $M = 1.77$, $SD = 0.85$, $n = 31$; $t = -0.41$, $p = .68$).

8. Physical Activity

Two aspects of physical activity were ascertained: times spent (a) on physical work or labor and (b) on physical exercise during the data collection period. Summated times per day that respondents spent on either of these activities were intraindividually averaged across the 7 days and square-root transformed prior to data analyses. Increased intake volumes of both mineral water and the total of all beverages were hypothesized to be the consequence of increased physical activities in these domains. While correlation coefficients for physical work or labor were not significant (with square-root transformed volume of mineral water intake: $r = -.01$, $p = .92$; with square-root transformed volume of total beverage intake: $r = -.13$, $p = .08$; both $N = 179$), coefficients for physical exercise turned out to be highly significant (with square-root transformed volume of mineral water intake: $r = .21$, $p = .00$; with square-root transformed volume of total beverage intake: $r = .23$, $p = .00$; both $N = 179$).

These findings were clearly backed by t-test results (see Table 14): While the time participants spent on physical work or labor left intake volumes unaffected, respondents who belonged to the upper quarter in terms of the time they spent on physical exercise drank significantly more mineral water and beverages overall than participants who did not exercise at all. It should be noted that the low groups in both domains of physical activity consisted exclusively of all respondents who did not report any of these activities at all, that is, the respondents whose summated time records were exactly 0.

Table 14

Group Differences for Beverage Intake Measures Between Persons Spending No Time vs. Much Time on Physical Activities (Low vs. High)

	Low		High			
Variable	*M*	*SD*	*M*	*SD*	*t*	*p*
Physical Work or Labor[a]						
Mineral water intake (rescaled scores; L) T	1.81	1.09	1.78	0.91	0.14	.89
Total beverage intake (rescaled scores; L) T	4.14	0.69	3.99	0.87	1.01	.31
Physical Exercise[b]						
Mineral water intake (rescaled scores; L) T	1.47	1.05	2.07	1.04	-2.88	.00
Total beverage intake (rescaled scores; L) T	3.80	0.68	4.18	0.73	-2.72	.01

Note. T = Square-root transformed scores.
[a]Low group: $n = 59$, high group: $n = 46$. [b]Low group: $n = 66$, high group: $n = 42$.

Results I: Summary and Preliminary Conclusions

Based on the above-listed findings, it must be concluded that (a) variety-seeking tendency, (b) food neophobia, (c) attitude toward eating or the importance of eating as conceptualized by the Eating Behavior and Weight Problems Inventory (IEG), (d) global daily mood and physical comfort, and (e) SES are not related to the volume of mineral water ingested by students in naturalistic environments. The time students spend on physical work or labor is related neither to their volume of mineral water intake nor to that of total beverage intake. Moreover and contrary to what had been hypothesized, variety-seeking tendency is also not related to the volume of total beverage intake or to the number of beverages in a student's relevant set.

The time students spend on physical exercise, however, was found to be positively and unequivocally related to both the volume of mineral water intake and the volume of total beverage intake; and food neophobia was negatively and equally clearly related to the number of different beverages used by the respondents during the data collection period, that is, to their relevant set. These three effects became evident as significant correlation coefficients and significant mean score differences between respondents standing very low versus very high on the predictor dimensions. Therefore, the underlying hypotheses can be confirmed: The more time students spend on physical exercise, the more they drink mineral water and beverages overall; and the more neophobic they are, in relation to food, the more likely they are to have a relevant set that is composed of a smaller number of different beverages compared to individuals who are less neophobic.

Less distinct relationships could be established between (a) knowledge of the composition of mineral water and how it is manufactured and (b) dietary restraint as predictors on the one hand and volume of mineral water intake on the other: While the mean score differences were significant here, the correlation coefficients for the total sample were not. Still the directions of the mean score differences are intuitively appealing for knowledge and confirming the hypothesis for dietary restraint: Individuals with much knowledge about mineral water and its production process and those who tend to exhibit distinctly restrained and largely cognitively controlled eating behavior tend to consume more mineral water, which is free of calories.

According to the criteria suggested by Cohen (1988, pp. 79-80; see also Bortz & Döring, 2006, p. 606), the three significant correlation coefficients reported above (ranging from r = -.18 to r = .23) have effect sizes which are midway between small and medium, although their corresponding coefficients of determination suggest a proportion of explained variance in mineral water intake of merely r^2 = .05 at the most.

Effect sizes d for the mean score differences were calculated according to Cohen's (1988, p. 20) formula where the absolute value of a mean score difference is divided by the standard deviation of the population, provided variances in both samples are homogeneous. In the present data, the variances in the low and high groups of all predictors were in fact homogeneous as evidenced by nonsignificant F tests so that all significant mean score differences in the dependent variables mentioned above were divided by their respective standard deviations obtained from the total effective sample (see Tables 6 and 7). Resulting values of the effect sizes ranged from $d = .51$ to $d = .61$ indicating medium-sized effects (Cohen, 1988, p. 26).

Interestingly, FNS scores are highly correlated with scores of the VARSEEK-scale ($r = -.76$, $p = .00$, $N = 171$). It was explicated in chapter 2 that variety-seeking tendency is closely related to the concept of sensory-specific satiety which, in turn, interacts antagonistically with food neophobia in controlling human nutrition behavior (the "omnivore's dilemma", Rozin, 1977, cited in Birch & Fisher, 1996, p. 131). Thus, both the direction and the strength of this relationship are not unexpected; the size of the correlation coefficient is similar to the range of coefficients that Meiselman, Mastroianni, Buller, and Edwards (1999, p. 5) found between these measures in samples of British students ($r = -.62$ to $r = -.63$).

5.3 Results II: Situation-Related Determinants of Mineral Water Intake

Although the present study was designed to take into account all situation-related determinants that might possibly have an impact on a respondent's beverage intake to a degree that was supposed to be equivalent to the influence that these factors typically exert in that person's daily life, three of these potential sources of environmental influence were explicitly studied: (a) the mutual social influence among members of the same household, that is, the participant and other persons, if any, living together with him or her on determinants of mineral water intake; (b) the weather; and (c) the relative share of total time participants spent at their homes or out of them, respectively, during the data collection period. These factors were addressed in Research Questions 9 to 11 (cf. chap. 3). It is noteworthy that the information for the assessment of the first two factors comes from external sources and is not solely based on what the participants reported.

Answers to Research Questions 9 to 11

9. Domestic Sources of Social Influence on Mineral Water Intake

This research question tackles the issue of social influence on food habits among persons living together in the same household, or more precisely, the social interdependency of behavior and behavioral beliefs related to mineral water intake between the respondents and other persons living together with them in their households, if any.

It will be remembered from chapter 2.3 that within the frameworks of the TPB and the TRA the attitude toward a behavior like mineral water intake is assumed to be determined by the beliefs held by a person about the consequences of that behavior, that is, by his or her behavioral beliefs. While the attitude toward mineral water intake is supposed to be one predictor of the intention to actually ingest mineral water, behavioral beliefs are in turn thought of as that attitude's informational, cognitive foundation that allow for a prediction of the attitude itself. Behavioral beliefs are further thought of as being decomposable into an individual's behavioral belief strength (i.e., that person's subjective probability that performing the behavior in question will lead to a specific outcome) and his or her outcome evaluation (i.e., the value he or she attaches to that outcome).

Based on the results of the qualitative elicitation study that was conducted first (see chap. 4), 20 different, readily accessible (i.e., salient) behavioral beliefs regarding mineral water intake were derived (for details see chap. 5.4). For each of these beliefs, two items were constructed, one for ascertaining that belief's strength and one for obtaining a corresponding measure of outcome evaluation. Both these lists were administered to both the respondents and any persons aged 14 or above living together with them in their households, provided these persons gave their consent to being asked. For wordings of all items measuring a respondent's behavioral belief strength see Appendix B1, Questions H23; for wordings of the items measuring a respondent's outcome evaluation see Appendix B1, Question H24; for the corresponding questions administered to the persons living together with the respondents see Appendix B4, Questions M7 and M8, respectively, where the same items appeared in exactly the same order.

Furthermore, information about habitual mineral water intake was obtained from both the respondents (see Appendix B1, Questions H4 to H6) and the persons living together with them (see Appendix B4, Questions M4 to M6) by means of food-frequency questions with different frames of temporal reference (i.e., frequency of mineral water intake in general, during the past 4 weeks, and during the past 7 days).

Given the present methodological approach, it will not be possible to establish a *direction* of influence from one group of persons onto the other in a causal sense; rather the analysis will be confined to determining social *interdependencies* of behavior and behavioral beliefs between the respondents and the persons living together with them. Overall, n = 84 respondents returned one or more questionnaires completed by the persons who were living together with them. Unfortunately, not all of these persons delivered fully completed questionnaires; in consequence, due to missing values in one or more of the variables that were used in the present context, only n = 74 respondents without any missing values in the relevant set of data from the people they were living with finally entered the analysis process. If a respondent had returned more than one questionnaire, because there was more than one person living together with him or her, data from these persons were averaged and matched with that respondent's data as arithmetic mean scores in order to arrive at estimates of average social influence within a household. Eventually, data from n = 89 persons living together with one of the n = 74 participants were processed.

Descriptive information about the relationship between the respondents and the persons they were living with is supplied in Table 15. The characteristics reported here are some of the factors that may be assumed to contribute to the mutual formation or alteration of food habits and their determinants among persons who live in the same household. The frequency with which activities related to the supply and preparation of foods are conjointly performed may indicate the strength of impact of these activities on the formation of nutrition behavior; also, the length of time a respondent and the person living with him or her have known each other before the data were collected as well as the quality of this relationship will be of some significance. It should be noted that the information provided in Table 15 is based on the answers given by the persons the respondents were living with, not by the respondents themselves. Answers from more than one person per household were averaged and rounded up or down, except of course for the qualitative description of the kind of relationship.

Table 15

Relationship Between Participants and the Persons They Were Living With

Characteristic	*n*	%
Frequency of sharing meals together [a]		
Less often than once a week	10	14
On 1 to 2 days a week	16	22
On 3 to 4 days a week	11	15
On 5 to 6 days a week	12	16
At least once a day	24	32
Frequency of going shopping together for food [a]		
Hardly ever	11	15
Seldom or very seldom	20	27
Sometimes	18	24
Often or very often	25	34

(Table 15 continues)

(Table 15 continued)

Characteristic	*n*	%
Length of time a participant and the person who completed a questionnaire have known each other [a]		
Less than 1 year	12	16
1 year to less than 2 years	7	9
2 years to less than 5 years	21	28
5 years to less than 10 years	11	15
10 years to less than 15 years	10	14
15 years or more	13	18
The person who completed a questionnaire was that participant's ... [b]		
partner	39	53
friend / housemate	30	41
parent	9	12
sibling	7	9
child	2	3
other person	2	3

Note. $n = 74$ participants or households, respectively. Answers reflect the point of view of the persons the participants were living with. For question wordings see Appendix B4, Questions M9 to M12.
[a]Averaged and rounded for households where more than 1 person completed a questionnaire.
[b]Not averaged; total number of persons: $n = 89$.

When looking at Table 15, it becomes obvious at first sight that this subsample is comparatively heterogeneous in terms of the variables under consideration. While roughly one sixth of the persons said to share a meal with the respondent less often than once a week or to hardly ever go shopping with him or her for food, about one third claimed to perform these activities at very high frequencies. Moreover, as one sixth said to have known the participant for no more than 1 year, nearly one third had been acquainted with the participant for 10 years or more. This heterogeneity is emphasized qualitatively by the fact that some respondents were still living together with members of their family of origin, while others had already found a partner to live with or even had their own child aged 14 or above.

These findings suggest that the present subsample is composed of respondents belonging to different populations in terms of their current position in the course of life; that is to say, they must be assumed to differ systematically regarding the presence and impact of factors that may have shaped, and later modified, their nutrition behavior during the process of socialization. In any case, 84% of the respondents had been acquainted with the person they were living with for at least 1 year, which implies that any forces triggering or directing the process of mutual assimilation of food habits among members of the same household had had a substantial period of time to unfold their power before data for the present study were collected.

Table 16 shows the correlation coefficients between scores assigned on 7-point rating scales by both the participants and the persons they were living with (a) to the strengths of 20 behavioral beliefs regarding the consequences of mineral water intake and (b) to 20 corresponding outcome evaluations. Items are numbered according to the sequences in which they appear on the questionnaires (for behavioral belief strength see Appendix B1, Question H23, or Appendix B4, Question M7; for outcome evaluation see Appendix B1, Question H24, or Appendix B4, Question M8). It should be noted that the sequences of items are identical for each of the pairs of questions measuring the same constructs, that is, behavioral belief strength on the one hand and outcome evaluation on the other hand, but that they differ between any questions asking for different constructs (in other words: the sequences of items are identical for Questions H23 and M7 but different from those for Questions H24 and M8, and vice versa).

Table 16

Correlations Between Participants and Persons They Were Living With for Items Measuring Behavioral Belief Strength and Outcome Evaluation

	Behavioral Belief Strength[a]		Outcome Evaluation[b]	
Item Number	*r*	*p*	*r*	*p*
1	.08	.48	.07	.56
2	.02	.86	.01	.92
3	-.00	.97	.26	.03
4	.18	.13	.22	.06
5	.05	.65	.29	.01
6	.05	.67	.16	.19
7	.25	.03	.26	.02
8	.18	.13	-.04	.75
9	.20	.09	.31	.01
10	.14	.25	.12	.31
11	.24	.04	.28	.01
12	.11	.37	.09	.44
13	.05	.66	.23	.05
14	.17	.15	.18	.12
15	.08	.50	.23	.05
16	.16	.18	.35	.00
17	.14	.25	-.08	.51
18	.30	.01	-.08	.48
19	.15	.21	.03	.78
20	.36	.00	.03	.83

Note. $n = 74$. Items are numbered according to their appearance on the questionnaire.
[a]For item wordings see Appendix B1, Question H23 or Appendix B4, Question M7.
[b]For item wordings see Appendix B1, Question H24 or Appendix B4, Question M8.

Correlation coefficients of four of the items measuring behavioral belief strength are significantly different from zero, indicating some degree of agreement between the respondents and the persons they were living with as regards the strength of salient behavioral beliefs related to mineral water intake. The significant items refer to (a) the ability of mineral water to supply the body with many required nutrients (Item 7), (b) its suitability for nearly all occasions where beverages may be consumed (Item 11), (c) its digestibility (Item 18), and (d) its high-quality character (Item 20).

This latter item is also the only one whose correlation coefficient remains significant even after adjusting the α level from $\alpha = .05$ (two-tailed) to $\alpha' = .0026$ in order to compensate for the inflated probability of a type I error due to the application of multiple significance tests. Correction of the α level was carried out according to the formula derived by Bortz, Lienert, and Boehnke (1990, p. 51)

$$\alpha' = 1 - (1 - \alpha)^{1/k}, \tag{7}$$

where α' is the corrected α level and k is the number of significance tests that are performed, which is 20 in the present case. This correction is slightly less conservative than the more traditional Bonferroni correction (i.e., $\alpha' = \alpha / k$; cf., e.g., Bortz, Lienert, & Boehnke, 1990, pp. 51-52). Thus, the global null hypothesis claiming that the behavioral beliefs related to mineral water intake were not correlated between the respondents and the persons they were living with must be rejected.

Quite similarly, seven items measuring outcome evaluation are significantly correlated between the two groups of persons. These items refer to the evaluation of the following characteristics of a beverage or outcomes of its intake: (a) supplying the body with many required nutrients (Item 3), (b) not causing weight gain (Item 5), (c) being free of calories (Item 7), (d) being sugar free (Item 9), (e) making the person keep in shape (Item 11), (f) being boring (Item 13), and (g) not tasting sweet (Item 16). Again, the coefficient for the latter item is the only one to remain significant even after adjusting the α level to $\alpha' = .0026$; the global null hypothesis of no interrelation between outcome evaluations of both groups of persons must therefore be rejected.

Next, correlation coefficients were determined between retrospective food-frequency measures of habitual mineral water intake that were obtained from the respondents on the one hand and from the persons they were living with on the other hand. Frequencies with which both groups of individuals habitually drank mineral water were ascertained by means of three different questions, each of which offered a different time frame: mineral water intake (a) in general, (b) during the past 4 weeks, and (c) during the past 7 days (for item wordings see Appendix B1, Questions H4 to H6, or Appendix B4, Questions M4 to M6). Correlation coefficients for these questions, in the order mentioned, were *r*s = .24, .18, and .32 (*p*s = .04, .12, and .01, respectively; all *n*s = 74). Adjusting the α level according to formula (7) for k = 3 renders α' = .0170, which is exceeded by the probability of the coefficient for the question which had a time frame of the past 7 days (i.e., Questions H6 or M6; it should be noted that it is likely that the *past 7 days* were *not* referring to exactly the same 7 days for both groups of persons, because it is not very likely that the persons living with a respondent completed the questionnaires on the very same day on which the respondents gave their answers to the frequency questions in the premeasurement session). Hence, the global null hypothesis claiming that habitual mineral water intake of the respondents were not correlated with habitual mineral water intake of the persons they were living with cannot be maintained.

Finally, correlation coefficients were examined between these two sets of retrospective measures of habitual mineral water intake on the one hand (i.e., the set obtained from the respondents and the other one obtained from the persons they were living with, each consisting of the above-mentioned three food-frequency questions), and the square-root transformed volume of actual mineral water intake reported prospectively by the respondents on the other hand. For the respondents, coefficients between their habitual mineral water intake (a) in general, (b) during the past 4 weeks, and (c) during the past 7 days and their actual intake were, in this order, *r*s = .63, .61, and .68 (all *p*s = .00; all *n*s = 74). Correlation coefficients between the same measures, but obtained from the persons the respondents were living with, and the respondents' actual mineral water intake were, in the same order as above, *r*s = .28, .26, and .28 (*p*s = .016, .03, and .015, respectively; all *n*s = 74).

While the probabilities of all correlation coefficients between a respondent's own habitual mineral water intake and his or her actual intake clearly exceed the adjusted $\alpha' = .0170$, still two of the probabilities of the correlation coefficients between respondents' actual mineral water intake and habitual mineral water intake of the persons they were living with remain significant after the α level had been adjusted. Nonetheless, in both cases the global null hypothesis of no relationship between habitual mineral water intake and a respondent's actual mineral water intake needs to be rejected.

10. The Weather

The second source of environmental influence on beverage intake behavior that was to be examined in this study was the weather. Weather data were obtained on a daily basis during the whole fieldwork time from the weather station at Hamburg Airport (available from http://www.wetteronline.de) and were matched with the data sets supplied by the participants. Among the various weather parameters that were available from this source, the air temperature was of paramount relevance due to theoretical considerations (cf. chap. 2.2); it was hypothesized that respondents who kept their beverage diary in warmer weather conditions would record higher volumes of mineral water and total beverage intake (cf. chap. 3).

Yet, since the influence of weather conditions on beverage intake behavior at the microlevel seems to have been investigated hardly ever before, some other weather parameters were obtained and subjected to a first step of data analysis too. The independent variables under investigation were: (a) minimum and (b) maximum air temperatures, (c) hours of sunshine, (d) relative air humidity, (e) barometric pressure, (f) wind speed, and (g) volume of rainfall. One value per day was issued by the above-mentioned source for each of these variables, reflecting either a parameter's peak level or its aggregated level over that day; these daily values were assigned to the data sets of all respondents reporting on the same day to approximate the atmospheric conditions individuals were actually exposed to when reporting their beverage intake behavior.

At the analysis stage, similar to how the data from the diary sheets were processed, weather data were aggregated for every respondent across the 7 days of his or her data collection period and were then subjected to the analyses as intraindividual mean scores, which thus reflected the average daily weather condition during a participant's data collection period. As intraindividually averaged minimum and maximum air temperatures were highly correlated across individuals (r = .92, p = .00, N = 179), both measures were aggregated and used also as a summated score in further analyses.

The same twofold strategy as for the person-related determinants was pursued to answer the question whether the weather was associated with total beverage or mineral water intake: (a) interindividual correlations between intraindividually averaged weather parameters and square-root transformed volumes of mineral water and total beverage intake, respectively, were determined; and (b) t tests were run for testing mean score differences in these dependent variables between respondents with very low scores in one of the temperature measures (i.e., scoring approximately at the level of the lower quartile Q_1 or below, called the *low group*) and those with very high scores in the same variables (i.e., scoring approximately at the level of the upper quartile Q_3 or above, called the *high group*). Again, analyses were based on the effective sample size (i.e., N = 179), and an α level of .05 (two-tailed) was used for all statistical tests.

Descriptive information about the weather variables is given in Table 17 together with the correlation coefficients. The descriptive information is supplied in order to allow for an estimate of the generalizability of the results in terms of the range of weather conditions respondents were exposed to in this study.

Table 17

Weather Parameters and Their Correlations With Beverage Intake Measures

					Correlations with			
					Mineral water intake[a]		Total beverage intake[a]	
Variable[b]	*M*	*SD*	*Min*	*Max*	*r*	*p*	*r*	*p*
Maximum temperature (°C)	13.4	5.0	6.3	22.7	-.03	.69	-.14	.05
Minimum temperature (°C)	6.0	4.1	-2.0	14.3	-.04	.63	-.16	.03
Sum of minimum and maximum temperature (°C)	19.4	9.0	4.7	35.5	-.03	.66	-.16	.04
Sunshine (hrs)	4.3	2.6	0.4	9.7	.04	.59	-.05	.50
Relative air humidity (%)	78.4	4.2	66.1	87.0	-.05	.50	.02	.76
Barometric pressure (hPa)	1010.7	20.4	866.7	1030.4	.07	.33	-.02	.82
Wind speed (km/hr)	15.6	4.5	8.0	25.6	-.11	.13	.01	.90
Rainfall (mm)	2.8	1.8	0.6	6.9	-.09	.25	-.04	.60

Note. $N = 179$.

[a]Scores rescaled to L and square-root transformed. [b]Daily measurements supplied by Hamburg Airport weather station (obtained from www.wetteronline.de); data were matched on a day-to-day basis with diary data of respondents who recorded intake on the same day and were then intraindividually averaged across the 7-day data collection period.

None of the weather parameters was significantly correlated with mineral water intake; also, none of them, except minimum temperature and the sum of minimum and maximum temperature, was significantly correlated with total beverage intake. Very surprisingly and contrary to what had been hypothesized, total beverage intake was *negatively* correlated with minimum and the sum of minimum and maximum temperatures. This phenomenon does not emerge, however, when looking at mean score differences between the high and low groups (see Table 18).

Table 18

Group Differences for Beverage Intake Measures Between Persons Reporting in Low- vs. High-Temperature Weather Conditions

	Low		High			
Variable	*M*	*SD*	*M*	*SD*	*t*	*p*
Maximum Temperature[a]						
Mineral water intake (rescaled scores; L) T	1.70	1.16	1.65	0.98	0.22	.83
Total beverage intake (rescaled scores; L) T	4.11	0.71	3.85	0.77	1.74	.09
Minimum Temperature[b]						
Mineral water intake (rescaled scores; L) T	1.57	1.13	1.73	1.03	-0.70	.48
Total beverage intake (rescaled scores; L) T	4.10	0.67	3.84	0.78	1.71	.09
Sum of Minimum and Maximum Temperature[c]						
Mineral water intake (rescaled scores; L) T	1.65	1.16	1.73	0.97	-0.33	.74
Total beverage intake (rescaled scores; L) T	4.11	0.67	3.86	0.77	1.63	.11

Note. T = Square-root transformed scores.
[a]Low group: $n = 48$, high group: $n = 50$. [b]Low group: $n = 47$, high group: $n = 47$. [c]Low group: $n = 41$, high group: $n = 45$.

11. Share of Time Spent at Home

The last question addressing situation-related determinants of mineral water intake asked for a relationship between the relative share of total time respondents spend at their homes or out of them, respectively, and the volume of mineral water they ingest.

While they were monitoring and recording their beverage intake, respondents concurrently supplied information on the diary sheets indicating on an analogous scale whether they were staying at their homes or out of them (see Appendix B2). This information was coded and punched for every hour of the data collection period as 1 (whole hour spent *at home*) or 0 (whole hour spent *out of home*); hours spent partly at home and out of home were coded as .25, .5, or .75, respectively, according to the approximate share of the hour that was spent at home. At the analysis stage, this information was aggregated to a score that indicated the relative share of the data collection period that a respondent had spent at his or her home; it was calculated as the ratio of the summated codes for all hours of the data collection period to the maximum number of hours a respondent could have spent at home (i.e., 7 * 24 = 168 hours). The resulting scores could range from 0 to 1 with higher values indicating more hours that were spent at home.

But as a result, neither the correlation coefficient between this score and the square-root transformed volume of mineral water intake was significant (r = .08, p = .30, N = 179) nor was the difference between the low group (i.e., persons who spent comparatively little time at home, scoring at the level of the lower quartile Q_1 or below: M = 1.45, SD = 1.05, n = 44) and the high group (i.e., persons who spent much time at their homes, scoring at the level of the upper quartile Q_3 or above: M = 1.82, SD = 1.10, n = 44; t = -1.61, p = .11).

Results II: Summary and Preliminary Conclusions

It can be concluded so far that neither the share of time students spend at their homes or out of them, respectively, nor the weather, at least not within the range that was observed during the time fieldwork was conducted for this study, is related to the volume of mineral water students ingest. Minimum air temperature, however, and the sum of minimum and maximum air temperature were found to be negatively correlated with total beverage intake, which is surprising as it contradicts both common experience and what had been hypothesized. It may be speculated that the weather measured at Hamburg Airport, even though the airport is located very close to the city, is a much too distal source of influence to act immediately on beverage intake behavior of individuals who are ranging freely in and around the city both indoors and outdoors; this will be discussed in more detail in chapter 6.1.

Despite the heterogeneity found in the subsample of participants who supplied completed questionnaires from any persons aged 14 or above who were living with them, a clear picture of mutual social influence between the respondents on the one hand and the persons they were living with emerges. While there appears to be some congruence between the two groups in terms of the strengths of the beliefs about the consequences of mineral water intake, there is even more agreement on the evaluation of the characteristics a beverage can have or of the consequences of its consumption. A focus of this agreement seems to be around the low-calorie or sugar-free character of a beverage.

Moreover, there is a relationship between the respondents and the persons they are living with in terms of (a) habitual mineral water intake of both groups reported retrospectively and (b) habitual mineral water intake on the one hand and actual mineral water intake of the respondents based on the beverage diaries on the other hand. Not unexpectedly, this latter relationship between actual intake of the respondents and habitual intake is much stronger for habitual intake of the respondents themselves than for habitual intake of the persons they are living with.

While the effect sizes of the correlation coefficients that were found *between* both groups of persons fall somewhere in the range from small to medium, effect sizes of the correlation coefficients found *among* the respondents between their habitual and actual behavior are large, with coefficients of determination going up as far as $r^2 = .46$ (cf. Cohen, 1988, pp. 79-80; see also Bortz & Döring, 2006, p. 606).

5.4 Results III: Models of Food Choice Applied to Mineral Water Intake

The remaining Research Questions 12 to 15 (see chap. 3) are concerned with the usefulness of four different models for the prediction and explanation of interindividual variation in volume of mineral water intake: (a) the theory of planned behavior (TPB), (b) the theory of reasoned action (TRA), (c) an extension of the TPB which incorporates weather parameters as well as selected TPB components related to other behavioral domains (i.e., physical work or labor and physical exercise), and (d) the

Pudel Westenhöfer model (PWM).

The components that the TPB and the TRA consist of are latent constructs that are represented by the ellipses in Figures 2 and 3 (see chap. 2); these constructs are hypothesized to be causally related to each other as indicated by the arrows connecting them. Being latent dimensions, they cannot be observed or measured directly, rather manifest items or scales need to be assigned to them as indicators in order to make them measurable. The next sections will determine the psychometric properties of the items and scales that were employed in this study for measuring the TPB and TRA components. These items and scales will be used in subsequent regression and path analyses to test the adequacy of the TPB and the TRA for the prediction and explanation of interindividual variation in volume of mineral water intake. Path analysis or structural equation modeling ([SEM]; e.g., Backhaus, Erichson, Plinke, & Weiber, 2006; Bagozzi, 1994; Byrne, 1998; Corbetta, 2002; Hildebrandt & Homburg, 1998; Homburg & Pflesser, 1999; Loehlin, 2004; Reinecke, 2005; Schumacker & Lomax, 1996; Ullman, 2001) is particularly useful when complex relationships between several latent dimensions, constructs, or factors need to be tested simultaneously while taking error of measurement into account (e.g., Miles & Shevlin, 2001; Saurina & Coenders, 2002; Ullman, 2001).

Traditionally, a path or structural equation model involving latent dimensions consists of two parts: (a) a structural model as depicted in Figures 2 and 3 which interrelates the latent dimensions, that is, the theoretical constructs of the TPB and TRA, in a causal sense; and (b) a measurement model which relates the manifest, observed variables as indicators to the latent dimensions. These indicators may be assigned to the latent dimensions at the item or aggregate level. While the use of aggregate measures is not a sensible thing to do when the focus of the research is on item analysis, it may be permissible when the research is aimed at investigating the relationships between the latent dimensions, as was the case in the present study; here, the primary goal was to find out to what extent, if any, the model components that are postulated by the TPB and the TRA can help to understand what drives mineral water intake.

In this study, aggregated indicators (in SEM literature often named "item parcels", e.g., Bandalos & Finney, 2001, p. 269) were constructed according to the traditional methods of item analysis (see below), which, in the context of applications of the TPB and TRA, are recommended by Ajzen (2002a; see also Francis et al., 2004), instead of resorting to confirmatory factor analysis, which Homburg and Giering (1998, pp. 118-126) refer to as a *second-generation* tool for item and scale analysis. Aggregate measures, as opposed to the items that they are made up of, (a) tend to be more reliable, (b) often have distributions that are more continuous and normal, (c) promise greater and thus more desirable ratios of respondents to estimated parameters or to manifest variables, respectively, given a constant sample size (e.g., Bandalos & Finney, 2001; Jackson, 2003; Little, Cunningham, Shahar, & Widaman, 2002; Nachtigall, Kroehne, Funke, & Steyer, 2003; Ullman, 2001).

First, in the sections that follow, results of item and scale analyses for TPB and TRA indicators will be reported, followed by SEM and regression analysis results for both models; afterwards item and scale analyses will be performed for constructs that were used to expand the TPB and TRA (air temperature, physical work or labor, and physical exercise), followed by corresponding SEM results. Finally, item analyses and computations in relation to an application of the PWM to the present data will be documented.

Item Analyses of TPB / TRA Variables

Mineral Water Intake

While the usefulness of a variety of measures of beverage and mineral water intake, the latter being clearly the most important dependent variable in this study, has already been discussed above (see chap. 5.2), no information has been given as yet about the internal structure of the intraindividually aggregated measure of volume of mineral water intake that was used for answering Research Questions 1 to 11 and that will be used again for answering the remaining research questions.

As will be recalled, respondents reported their beverage intake for 7 consecutive days, but not all of them started recording on the same day of the week; instead, day 1 of an individual's data collection period could have been any day from Tuesday to Saturday (see chap. 5.1). Given the relative unobtrusiveness of the diary approach, resulting in minor or negligible influence of reactivity on the data and sufficient ecological validity and representativeness of the data (cf. chap. 5.2), it seemed to be reasonable to rearrange the temporal order of the recorded volumes of intake from day 1 to day 7 of an individual's data collection period to the natural sequence of the days from Monday to Sunday so that, in the data file, intake volumes on, for instance, all Thursdays were fed into one variable, regardless of whether Thursday had been a respondent's first, third, or last day of his or her data collection period. While leaving the intraindividually aggregated mean scores unaffected, this procedure promised to capture the effect that a particular day of the week may have had on volume of mineral water intake.

Table 19 shows the volumes of mineral water that were ingested on different days of the week. However, no remarkable differences between the days emerge, although the average volume consumed on a working day (i.e., Monday to Friday) is slightly higher (M = 583 ml) than on a Saturday or Sunday (M = 536 ml).

Table 19

Psychometric Properties of Volumes of Mineral Water Intake (ml) for the Days of the Week

Volume on a ...	*M*	*SD*	r_{it}[a]
Monday	570	761	.81
Tuesday	563	679	.88
Wednesday	630	727	.79
Thursday	542	652	.77
Friday	609	714	.75
Saturday	528	644	.75
Sunday	543	694	.74

Note. $N = 179$. Raw scores.

[a]Corrected day-total correlation.

Also, neither correlation coefficients between intake on a particular day and the sum of all other days (i.e., corrected day-total correlations; see Table 19) nor correlation coefficients between all possible pairs of days (see Table 20) show strong variability, indicating a high level of equivalence and thus comparability of the days in terms of volumes of ingested mineral water. Internal consistency for the intraindividually aggregated volumes of intake across the 7 days, which is in fact a measure of the temporal stability of mineral water intake, is high (Cronbach's $\alpha = .93$) and will serve as an estimate of that measure's reliability.

Table 20

Intercorrelations for Volumes of Mineral Water Intake Between the Days of the Week

Volume on a ...	1	2	3	4	5	6	7
1. Monday	-						
2. Tuesday	.80*	-					
3. Wednesday	.71*	.82*	-				
4. Thursday	.63*	.70*	.70*	-			
5. Friday	.65*	.69*	.61*	.69*	-		
6. Saturday	.66*	.68*	.61*	.62*	.62*	-	
7. Sunday	.65*	.71*	.60*	.59*	.60*	.66*	-

Note. $N = 179$. Based on raw scores.
* $p < .05$.

Attitude Toward Mineral Water Intake (Direct Measure)

According to the TPB, the *intention* to ingest mineral water, one of the proximal predictors of intake, is itself determined by an individual's *attitude toward the behavior* in question as well as by his or her *subjective norm* and *perceived behavioral control.* These three determinants can be ascertained in two different ways, directly and indirectly, that is, belief-based (see chap. 2.3).

In order to obtain a *direct* measure of the attitude toward mineral water intake, a Likert-type scaling procedure was used in this study. Ajzen (2002a, p. 4; see also Francis et al., 2004) recommends researchers to include three types of items in an attitude scale: instrumental and experiential ones and those capturing overall evaluation. Instrumental items are related to the effect of the behavior (e.g., "would be harmful to me"); experiential ones reflect how it feels to perform the behavior (e.g., "would be unpleasant"); overall evaluation can be measured with items like "would be a good thing to do". Following Ajzen's (2002a, p. 5) suggestions, eight items of these three types with changing evaluative directions of their wordings were administered in the present study (for item wordings see Appendix B1, Question H18), referring to a participant's mineral water consumption during the next 7 days. Response format was a 7-point rating scale that ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Hence, summated ratings of the direct attitude measure could range from 8 to 56 points with higher scores indicating a more favorable attitude toward drinking mineral water in the forthcoming 7 days. Psychometric properties of these items are reported in Table 21. Item numbering follows the sequence in which they appear on the questionnaire.

Table 21

Psychometric Properties of the Items of the Direct Measure of Attitude Toward Mineral Water Intake

Item Number[a]	M	SD	r_{it}[b]
1	5.74	1.65	.77
2 (R)	5.15	1.98	.61
3 (R)	6.86	0.62	.34
4	5.44	1.81	.78
5 (R)	5.81	1.78	.57
6	5.74	1.72	.74
7	5.88	1.59	.66
8 (R)	5.91	1.63	.68

Note. N = 179. Response format: 7-point rating scale (ranging from 1 to 7). (R) = Reversed item.

[a]Items are numbered according to their appearance on the questionnaire (see Appendix B1, Question H18). [b]Corrected item-total correlation.

Obviously, there is a ceiling, or better floor, effect in item 3 resulting in low variance of the scores; in consequence, item-total correlation is also comparatively low. Eliminating this item caused Cronbach's α to increase from .88 to .89. The final scale was therefore reduced to contain only the other seven items; its scores could range merely from 7 to 49 points.

Subjective Norm (Direct Measure)

Quite similarly, there are two different types of items that can capture subjective norm directly, those that have an injunctive quality (i.e., items expressing what important others expect a person to do or to refrain from) and those that have a descriptive quality (i.e., items describing whether important others themselves perform the behavior in consideration). In this study (see Appendix B1, Question H20), six items were given to respondents, four of which were injunctive (e.g., "Most people or institutions whose opinion about nutritional issues I appreciate would encourage me if I drank mineral water as frequently as possible instead of other beverages") using again a 7-point rating scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*); and two of them had a descriptive quality using a different 7-point rating scale (e.g., "According to my appraisal, most people whose opinion about nutritional issues I appreciate tend to drink mineral water *seldom - frequently*"; see chap. 2.3; see also Ajzen, 2002a; Francis et al., 2004).

Scores of the direct measure of subjective norm could thus range from 6 to 42 points; higher scores were indicating stronger perceived social pressure to perform mineral water intake behavior. Psychometric properties of the items are reported in Table 22. Item numbering follows the sequence in which they appear on the questionnaire. Cronbach's α was .85 for the summated ratings of the six items.

Table 22

Psychometric Properties of the Items of the Direct Measure of Subjective Norm

Item Number[a]	*M*	*SD*	r_{it}[b]
1	5.44	1.81	.75
2	4.84	1.97	.73
3	4.42	2.28	.59
4 (R)	5.44	1.82	.61
5	5.18	1.49	.63
6	5.01	1.47	.62

Note. $N = 179$. Response format: 7-point rating scale (ranging from 1 to 7). (R) = Reversed item.

[a]Items are numbered according to their appearance on the questionnaire (see Appendix B1, Question H20). [b]Corrected item-total correlation.

Perceived Behavioral Control (Direct Measure)

In the present study, eight items were given to respondents to obtain a direct measure of perceived behavioral control; they were aimed at capturing (a) the perceived-difficulty or self-efficacy component of the construct (i.e., the ease or difficulty of performing a behavior or the confidence a person has in his or her abilities to perform a behavior) as well as (b) the aspect of perceived controllability (i.e., whether behavioral performance is up to the acting person; see chap. 2.3; see also Ajzen, 2001, 2002a, b; Cheung & Chan, 2000; Francis et al., 2004). Four items were intended to measure perceived difficulty or self-efficacy (e.g., "If I wanted to, it would be very easy for me to drink mineral water at least once a day during the next 7 days"; response format: 7-point rating scale from 1 *strongly disagree* to 7 *strongly agree*; see Appendix B1, Question H21, items 2, 4, 7, and Question H22), while four others were intended to assess perceived controllability (e.g., "Whether I drink much mineral water during the next 7 days, is *not at all - entirely* up to me"; see Appendix B1, Question H21, items 1, 3, 5, and 6).

Scores of the direct measure of perceived behavioral control could thus range from 8 to 56 points; higher scores were indicating stronger confidence in one's capability of performing mineral water intake behavior in the forthcoming 7 days. Psychometric properties of the items are reported in Table 23. Items are numbered in accordance with the sequence in which they appear on the questionnaire. Cronbach's α was .76 for the summated scores.

Table 23

Psychometric Properties of the Items of the Direct Measure of Perceived Behavioral Control

Item Number[a]	*M*	*SD*	r_{it}[b]
1	5.90	1.61	.52
2	5.45	1.81	.52
3	6.54	0.91	.52
4	6.39	1.45	.55
5 (R)	6.23	1.37	.33
6 (R)	4.89	2.06	.38
7	5.99	1.48	.47
8	5.49	1.53	.53

Note. *N* = 179. Response format: 7-point rating scale (ranging from 1 to 7). (R) = Reversed item.

[a]Items are numbered according to their appearance on the questionnaire: Items 1-7: Question H21; Item 8: Question H22 (see Appendix B1).

[b]Corrected item-total correlation.

Coefficients of item-total correlations for items 5 and 6 were comparatively low; but as their elimination would not have increased internal consistency of the aggregated measure, it was decided to keep them in the scale.

Normative Beliefs (Indirect Measures)

Indirect, belief-based measures of the three predictors of the intention to ingest mineral water (i.e., attitude toward the behavior, subjective norm, and perceived behavioral control) are generated by multiplying, and summing up, pairs of items and thus constructing the behavioral, normative, and control beliefs, respectively, which make up the informational foundation of the corresponding predictor. Knowing which beliefs are important predictors of their respective direct measures will allow for an in-depth understanding and explanation of behavioral intention and, eventually, intake behavior; it may also offer some clues as to how behavior can be changed. Before starting to analyze the beliefs, however, it is mandatory to apply *optimal scaling* to the raw data to arrive at "formally meaningful statements" (Doll & Orth, 1993, p. 400), as was explicated in chapter 2.3. The present section and the next that follow will describe how salient beliefs were derived from the target population by means of the qualitative elicitation study (see chap. 4), and how they were optimally scaled and thus prepared for further analyses.

As was already mentioned in chapter 4.2, the majority of respondents in the qualitative elicitation study was unable to mention any potential normative referent, whom they saw as a person or organization whose opinion about nutritional issues mattered to them, neither an approving nor a disapproving one; a fact that leads to the assumption that the majority of respondents was not aware of or was unable to conceive of a social frame of normative reference in relation to their ingesting mineral water. Those respondents who did name a normative referent, however, mentioned their family, including partners and parents, and physicians as approving referents, and friends and persons with whom they went out as disapproving ones (cf. Appendix C, Tables C3 and C4). Based on this input, seven items targeting normative referents were constructed to obtain *normative belief strength* (see Appendix B1, Question H27) and seven corresponding items that were intended to measure a participant's *motivation to comply* with each of these referents (see Appendix B1, Question H28; 7-point rating scales for both questions; note that the order of corresponding items at H27 is different from H28).

Because there is no a priori way to determine how rating scales that the items are measured on should finally be scored, and, in particular, whether they should be scaled in a unipolar or bipolar fashion (i.e., with the zero point between the endpoints of the scale), any assignment of numbers to the scale points, prior to optimal scaling, is completely arbitrary (cf., e.g., Ajzen, 1991, 2002a; see also chap. 2.3). In the present study, following an intuitive approach which had been taken by other authors before, normative belief strength was bipolarized before optimal scaling was applied, by subtracting 4 from each individual score (i.e., rescaled scores ranged from -3 to +3); the scores for motivation to comply were left unchanged (i.e., with scores ranging from 1 to 7).

In order to apply optimal scaling, the direct measure of subjective norm (see above) was regressed on (a) the sum of all items measuring normative belief strength, (b) the sum of all items measuring motivation to comply with normative referents, and (c) the sum of normative beliefs (i.e., the products of corresponding items measuring normative belief strength and motivation to comply). In the present context, however, only five normative beliefs were summed up instead of all seven: A respondent's partner (i.e., spouse, boyfriend, girlfriend) and any persons living together with the respondent in the same household, though they must be suspected to be very important normative referents, were ignored in subsequent analyses, because, quite naturally, there was a substantial share of respondents who either did not have a partner or were living in single-person households. Omitting these participants from the analyses, because of missing data, would have led to a massive reduction in sample size, while omitting the normative referents will presumably lead to a loss of explanatory power of the subjective-norm component. However, as both options were viable, their pros and cons were traded off, and preference was finally given to the latter procedure so that the full sample size could be maintained for all further analyses.

Results of multiple regression analysis are shown in Table 24. The direct measure of subjective norm was square transformed before it was submitted to the analyses (scale transformations will be discussed later, see below, in the section about scale analyses).

Table 24

Regression Analysis Summary for Indirect Measures of Subjective Norm Predicting the Direct Measure

Predictor	B^a	$SE\ B$	β
Sum of normative belief strengths	61.73	17.88	0.46*
Sum of motivations to comply	-5.69	9.66	-0.07
Sum of products (normative beliefs)	3.15	4.85	0.11

Note. Adjusted $R^2 = .28$ ($N = 179$, $p < .05$).
[a]Constant term omitted.
* $p < .05$.

As was explicated in chapter 2.3 (cf. in particular formulae 3 to 5), division of the *unstandardized* regression coefficient obtained for the sum of belief strengths (i.e., 61.73) by the value obtained for the sum of products (i.e., 3.15) gives an estimate of the rescaling constant for motivations to comply, while the division of the coefficient for the sum of motivations to comply (i.e., -5.69) by the value obtained for the sum of products gives an estimate of the rescaling constant for normative belief strengths (see also Ajzen, 1991, 2002a; Dohmen, 1985; Dohmen, Doll, & Orth, 1986; Doll & Orth, 1993; Holbrook, 1977; Laroche, 1978; Orth, 1985, 1987).

Scores for all items measuring normative belief strength and for those measuring motivations to comply were corrected by their respective rescaling parameters at the individual level; then, items and products were aggregated again, and the regression analysis was repeated. Results are shown in Table 25. Regression coefficients for the sums are 0 now, while the unstandardized coefficient for the sum of products as well as adjusted R^2 remained unchanged (for intercorrelations of all seven variables used in the present context see Appendix D, Table D3).

Table 25

Regression Analysis Summary for Optimally Scaled Indirect Measures of Subjective Norm Predicting the Direct Measure

Predictor	B^a	*SE B*	β
Sum of normative belief strengths	-0.00	110.94	-0.00
Sum of motivations to comply	-0.00	5.76	-0.00
Sum of products (normative beliefs)	3.15	4.85	0.54

Note. Adjusted R^2 = .28 (N = 179, p < .05).
[a]Constant term omitted.

Control Beliefs (Indirect Measures)

Contrary to their reaction to being asked about potential normative referents, the majority of respondents was able to mention at least one control factor in the qualitative elicitation study that they believed would facilitate or impede their mineral water intake. The main facilitating factors can be grouped around four topics: (a) physical exercise; (b) when feeling warm (e.g., in warm weather conditions); (c) the situation or location (e.g., when being at work or at the university); and (d) the availability of mineral water or other, competing beverages in the situation. The main impeding factors were: (a) when respondents felt cold (e.g., in cold weather conditions); (b) when better tasting beverages were available in the situation; and (c), quite in line with the findings for the normative referents, when being in social settings (e.g., in the company of friends, on a party, in a bar, when going out at night; see chap. 4.2; cf.

also Appendix C, Tables C5 and C6). Given this input, 10 items were constructed to measure *control belief strength* (see Appendix B1, Question H29) and 10 corresponding items that were meant to measure *control belief power* (see Appendix B1, Question H30; 7-point rating scales for both questions; note that the order of corresponding items at H29 is different from H30).

Before optimal scaling was applied to these measures too, items targeting control belief power were bipolarized by subtracting 4 from each individual score (i.e., rescaled scores ranged from -3 to +3), while the scores for control belief strength were left unchanged (i.e., ranging from 1 to 7). Then, the direct measure of perceived behavioral control (see above), which was square transformed before it was submitted to the analyses (see below), was regressed on (a) the sum of all items measuring control belief strength, (b) the sum of all items measuring control belief power, and (c) the sum of control beliefs (i.e., the products of corresponding items measuring control belief strength and control belief power; see Table 26).

Table 26

Regression Analysis Summary for Indirect Measures of Perceived Behavioral Control Predicting the Direct Measure

Predictor	B^a	$SE\ B$	β
Sum of control belief strengths	15.53	7.77	0.16*
Sum of control belief powers	-3.83	16.08	-0.06
Sum of products (control beliefs)	4.92	3.40	0.40

Note. Adjusted $R^2 = .17$ ($N = 179, p < .05$).
[a]Constant term omitted.
* $p < .05$.

Afterwards, all items were optimally rescaled at the individual level according to formulae (3) to (5), and items and products were aggregated again. Results of the regression analysis with rescaled measures are shown in Table 27; the unstandardized coefficient for the sum of products as well as adjusted R^2 remained unchanged again (for intercorrelations of all seven variables used in the present context see Appendix D, Table D4).

Table 27

Regression Analysis Summary for Optimally Scaled Indirect Measures of Perceived Behavioral Control Predicting the Direct Measure

Predictor	B^a	*SE B*	β
Sum of control belief strengths	-0.00	15.89	-0.00
Sum of control belief powers	-0.00	13.54	-0.00
Sum of products (control beliefs)	4.92	3.40	0.43

Note. Adjusted $R^2 = .17$ ($N = 179$, $p < .05$).
[a]Constant term omitted.

Behavioral Beliefs (Indirect Measures)

Results of the qualitative elicitation study suggest that students' salient favorable beliefs regarding the intake of mineral water are focused on a variety of topics including the thirst-quenching and refreshing character of mineral water, its low-calorie character, healthiness, availability, and taste, as well as economic aspects (i.e., its good value for money) and other issues, while unfavorable beliefs are related to, for instance, the taste being bland and thus boring, or the fact that no vitamins are contained (see chap. 4.2; cf. also Appendix C, Tables C1 and C2). These findings, complemented by some of the results that Wüstefeld-Würfel (1999) extracted from the qualitative pilot study of her representative survey, were used to construct two sets of 20 items each that were intended to measure the antecedents of the attitude toward the behavior (i.e., toward ingesting mineral water). One set was meant to quantify *behav-*

ioral belief strength (see Appendix B1, Question H23), and the other set of corresponding items was designed to capture *outcome evaluation* (see Appendix B1, Question H24; 7-point rating scales for both questions; note that the order of corresponding items at H23 is different from H24).

Items related to outcome evaluation were bipolarized by subtracting 4 from each individual score (with rescaled scores thus ranging from -3 to +3), while the scores for behavioral belief strength were left unchanged (i.e., ranging from 1 to 7). After the direct measure of attitude toward ingesting mineral water (see above) had been square transformed (see below), it was regressed on (a) the sum of all items measuring behavioral belief strength, (b) the sum of all items measuring outcome evaluation, and (c) the sum of behavioral beliefs (i.e., the products of corresponding items measuring behavioral belief strength and outcome evaluation; see Table 28).

Table 28

Regression Analysis Summary for Indirect Measures of Attitude Toward the Behavior Predicting the Direct Measure

Predictor	B^a	$SE\ B$	β
Sum of behavioral belief strengths	-3.76	5.52	-0.07
Sum of outcome evaluations	-73.53	12.60	-1.29*
Sum of products (behavioral beliefs)	14.06	2.06	1.75*

Note. Adjusted $R^2 = .42$ ($N = 179, p < .05$).

[a]Constant term omitted.

* $p < .05$.

Both the unexpected *negative* sign of the standardized partial regression coefficient (i.e., β weight) for the sum of outcome evaluations, which is opposite to the sign of the bivariate correlation coefficient between the sum of outcome evaluations and the direct measure (see Appendix D, Table D5), and the *size* of the β weights for the sum of outcome evaluations and the sum of products, which both exceed 1, signal the presence of a suppression effect occurring among the independent variables (cf., Bortz, 1989, pp. 562-566; Tabachnick & Fidell, 2001, pp. 148-149). However, this effect vanished after optimal scaling at the individual level according to formulae (3) to (5) had been performed on the basis of the inflated β weights (see Table 29). Also, as was true for the other two constructs (see above), the unstandardized coefficient for the sum of products as well as adjusted R^2 remained unchanged.

Table 29

Regression Analysis Summary for Optimally Scaled Indirect Measures of Attitude Toward the Behavior Predicting the Direct Measure

Predictor	B^a	*SE B*	β
Sum of behavioral belief strengths	-0.00	5.10	-0.00
Sum of outcome evaluations	0.00	3.75	0.00
Sum of products (behavioral beliefs)	14.06	2.06	0.65*

Note. Adjusted R^2 = .42 (N = 179, p < .05).
[a]Constant term omitted.
* p < .05.

It is also noteworthy that, after individual scores had been optimally rescaled, β weights for all three sums of products that were discussed in the present context (i.e., normative, control, and behavioral beliefs) were equal to the bivariate correlation coefficients between them and their respective direct measures (cf. Tables 25, 27, 29 and Appendix D, Tables D3 to D5).

Scale Analyses of TPB / TRA Variables

In a first step, the adequacy of the *direct* measures of the TPB, and the TRA, for the prediction and explanation of interindividual variation in volume of mineral water intake will be tested using SEM. There will be *one aggregated* indicator for mineral water intake as well as for each of the three direct predictors of behavioral intention (i.e., attitude toward ingesting mineral water, subjective norm, and perceived behavioral control). Yet, the *intention* to ingest mineral water, one of the proximal predictors of intake, will have *four item-level* indicators attached to it, which were administered in the premeasurement session (see Appendix B1): (a) frequency of planned mineral water intake across the forthcoming 7 days (Question H10, 6-point rating scale ranging from 1 *never* to 6 *very often*), (b) number of days in the forthcoming week on which respondents intended to ingest mineral water (Question H11, scale ranging from *0* to *7 days*), (c) volume of mineral water that respondents intended to ingest over the next 7 days (Question H12, open-ended response format where the volume had to be inserted in ml), and (d) intention to have a high ratio of mineral water intake to total beverage intake during the forthcoming 7 days (Question H17, Item 1; 7-point rating scale ranging from 1 *strongly disagree* to 7 *strongly agree*).

An overview of distribution parameters of these predictors is given in Table 30. Information about distributional properties of mineral water intake and square-root transformed mineral water intake was given already in chapter 5.2 (see Tables 6 and 7).

Table 30

Measures Used in the Theory of Planned Behavior (TPB)

Variable	*M*	*SD*	Skewness[a]	Kurtosis[b]
Attitude toward ingesting mineral water (direct measure)	39.65	9.42	-1.36	1.50
Subjective norm (direct measure)	30.33	8.34	-0.82	0.04
Perceived behavioral control (direct measure)	46.90	7.67	-1.20	1.25
Frequency of planned mineral water intake[c]	4.41	1.65	-0.75	-0.69
Number of days of intended mineral water intake[c]	4.72	2.60	-0.62	-1.19
Intended volume of mineral water intake (ml)[c]	4,238	3,999	1.18	1.36
Intended high ratio of mineral water intake to total beverage intake[c]	4.17	2.23	-0.05	-1.50

Note. $N = 179$.

[a]$SE = 0.18$. [b]$SE = 0.36$. [c]For item wordings see Appendix B1, Questions H10 to H12 and Question H17, Item 1.

In the case of negative skewness, Miles and Shevlin (2001, p. 84) recommend to square transform the raw scores (see also Cohen, Cohen, West, & Aiken, 2003, pp. 246-247), which was done here for the direct measures. Square-root transformation was executed in the case of (positively skewed) intended volume of mineral water intake; prior to transformation, raw scores of this latter measure were rescaled from milliliters to liters (for a discussion of transforming positively skewed variables see chap. 5.2). Table 31 shows the parameters for the transformed measures; it can be seen that distribution properties have generally improved. Correlations between the original measures and their transformed counterparts ranged from $r = .95$ to $r = .99$. Therefore, transformed scores had been used in regression analyses for the optimal scaling procedures reported above and will be used in all analyses that follow.

Table 31

Transformed Measures Used in the Theory of Planned Behavior (TPB)

Variable	*M*	*SD*	Skewness[a]	Kurtosis[b]
Attitude toward ingesting mineral water				
(direct measure) T2	1660.65	637.85	-0.75	-0.36
Subjective norm (direct measure) T2	989.08	456.33	-0.26	-0.91
Perceived behavioral control (direct measure) T2	2258.06	654.42	-0.74	0.03
Intended volume of mineral water intake				
(rescaled scores; L)[c] T	1.77	1.06	0.05	-0.73

Note. $N = 179$. T2 = Square transformed scores. T = Square-root transformed scores.
[a]$SE = 0.18$. [b]$SE = 0.36$. [c]For item wording see Appendix B1, Question H12.

It should be noted, though, that summing up items and either square or square-root *transforming the summated scores*, as was done in the case of the direct measures of the predictors of behavioral intention, which will be used for fixing parameters in SEM (see below), does not produce the same result as carrying out the same transformation at the item level and then *summing up the transformed items*. However, as far as the internal consistencies of these sums are concerned, both approaches yield values of Cronbach's α which differ merely in the third or second decimal place at the most. In consequence, estimates of α based on untransformed items will be used to fix a measure's loading in SEM even though the transformed sums of these items were used to obtain the correlation matrices that SEM will be based on.

Comments on Statistical Analyses

In order to answer the final Research Questions 12 to 15 (see chap. 3), multiple regression analysis as well as SEM were employed. SEM was conducted using SEPATH, a module that was developed by Steiger (1995) and that forms an integrated part of the software package Statistica (by StatSoft, Inc.). Though this module seems to have been used only rarely in the past (for exceptions see, e.g., Brown & Barrett, 1999; Graf & Uttl, 1995; Svensson, Sinervo, & Comendant, 2002; Uttl & Graf, 1997), its reputation is well acknowledged in the scientific community (cf., e.g., Byrne, 1998; Loehlin, 2004; Miles & Shevlin, 2001; Reinecke, 2005; Schermelleh-Engel, Moosbrugger, & Müller, 2003; Schumacker & Lomax, 1996). And, unlike better known programs such as LISREL, AMOS, or EQS, it offers one "unique selling point" (Miles & Shevlin, 2001, p. 213): It can correctly analyze a correlation matrix. "*SEPATH* analyzes the correlation matrix correctly.... *SEPATH* gives the correct standard errors, estimates, and test statistics when a correlation matrix is analyzed directly.... *SEPATH* can estimate a *completely standardized path model*, where all variables, both manifest and latent, are standardized to have unit variance, and standard errors of the path coefficients can be estimated as well" (Steiger, 1995, p. 318; see also Loehlin, 2004, p. 80; Miles & Shevlin, 2001, p. 213).

As the intention of the present study was *not* to predict *exact* volumes of mineral water intake but to *identify* drivers of intake and to determine their *relative weights*, the use of fully standardized path models appeared to be the option of choice. In a similar vein, emphasis has been and will be put on the interpretation of standardized coefficients in multiple regression analyses (i.e., β weights), as opposed to unstandardized coefficients (see above and below). Also, since no comparisons between, for example, different populations or points in time were to be made, the use of standardized variables in SEM seemed to be justified (cf. Loehlin, 2004). In this study, therefore, SEM will be based on correlation matrices, not on covariance matrices.

When all variables, manifest and latent, have unit variance, it is not necessary to fix the loading of one of the indicators assigned to a latent variable to the value of 1, or any other value, in order to establish the scale of a factor, as is usually done in unstandardized models. Instead, all path coefficients between latent variables and their indicators should be freed and estimated by the procedure (Steiger, 1995), except when a factor is measured by one indicator only; in this case its loading should be constrained to a value that takes the error of measurement appropriately into account. In the present case of multiple-item composites, a good estimate of the loading can be derived from the empirically determined reliability of the indicator, that is, the square root of, for example, Cronbach's α or the split-half reliability coefficient (e.g., Bagozzi & Baumgartner, 1994; Kaiser & Gutscher, 2003; Loehlin, 2004; Saurina & Coenders, 2002); the latter coefficient will also be upgraded according to the Spearman-Brown prophecy formula (e.g., Lienert, 1989).

Parameters in SEM were estimated using both Generalized Least Squares (GLS) and Maximum Likelihood (ML) estimation procedures; the former was employed to perform the first five iterations of a model's estimation procedure, the latter to perform all remaining iterations. A sufficient number of iterations was preset so that convergence could occur for all models. Though the Maximum Likelihood procedure assumes multivariate normality of the manifest variables, it seems to be quite robust against violations of this assumption. If variables are skewed, correctly specified models may be falsely rejected more often than expected, in other words, type I error rates for model rejection may be inflated (Balderjahn, 1998, p. 376; Schermelleh-Engel, Moosbrugger, & Müller, 2003, p. 26; see also Olsson, Foss, Troye, & Howell, 2000), which is better still than running the increased risk of falsely accepting a misspecified model.

The minimum sample size necessary to carry out SEM is debated in the literature, but the effective sample size of N = 179 respondents that was achieved in this study, and that all models reported below are based on, may be considered to be sufficient, though not opulent (cf., e.g., Backhaus, Erichson, Plinke, & Weiber, 2006; Jackson, 2003; Lei & Lomax, 2005; Nachtigall, Kroehne, Funke, & Steyer, 2003; Schermelleh-Engel, Moosbrugger, & Müller, 2003; Schumacker & Lomax, 1996; Ullman, 2001). All models reported hereafter were overidentified, that is, they had positive numbers of degrees of freedom.

Once model parameters had been determined, the fit of a model and its components was checked and indications of any misspecifications in the model were looked for. First, path coefficients that were to be estimated during the iteration process were checked to see whether (a) they were in the permissible range of values (i.e., from -1 to +1), (b) their algebraic sign indicated an influence in the hypothesized direction (i.e., two variables, latent or manifest, which were supposed to correlate positively with each other should have a path coefficient with a positive sign, and vice versa), (c) their standard errors were reasonably small and roughly of the same magnitude, and (d) high absolute values were accompanied by high *t* values, and vice versa. Second, it was made sure that path coefficients between manifest variables and their corresponding latent variables were equal to or greater than .7, which implied indicator reliabilities of roughly .5 (i.e., $.7^2$) at the least. Third, standardized residuals were checked to make sure that none of the values was greater than .1. Standardized residuals are the difference scores between the empirically derived input correlation coefficients, which model estimation is based on, and the correlation coefficients that are implied by the estimated model parameters.

Finally, the fit of a model was investigated. "Model fit determines the degree to which the structural equation model fits the sample data" (Schermelleh-Engel, Moosbrugger, & Müller, 2003, p. 24), it tries to answer the central question "Is it a good model?" (Ullman, 2001, p. 697). In order to answer this question, "numerous measures of model fit have been proposed. In fact, this is a lively area of research with new indices seemingly developed daily" (Ullman, 2001, p. 698); "there are, literally, dozens of such indices" (Steiger, 1995, p. 338). "Applied researchers often have difficulty determining the adequacy of structural equation models because various measures of model fit point to conflicting conclusions about the extent to which the model actually matches the observed data. Software programs such as ... SEPATH (Steiger, 1995) ... provide a variety of fit indices for model evaluation. As there does not exist a consensus about what constitutes a 'good fit' (Tanaka, 1993), the fit indices should be considered simultaneously" (Schermelleh-Engel, Moosbrugger, & Müller, 2003, p. 24). This advice was complied with in the present study.

The most commonly used index is a χ^2 statistic which allows for testing the hypothesis that the sample covariance matrix is not significantly different from the estimated population covariance matrix. However, this statistic is not only very sensitive to violations of the assumption of normally distributed data and to sample size, with large samples yielding almost always significant differences, but it is also generally not applicable when SEM is based on *correlation* matrices (Backhaus, Erichson, Plinke, & Weiber, 2006, p. 379).

Instead, the following fit indices will be reported in subsequent analyses: (a) root mean square error of approximation (RMSEA), whose values should be smaller than .1 to be indicative of an acceptable model fit and smaller than .05 to indicate good fit; (b) root mean square standardized residual (RMS, sometimes also referred to as SRMR), whose critical values are very similar to those of RMSEA; (c) goodness-of-fit index (GFI), which should have values greater than .9 for acceptable model fit and greater than .95 for good fit; (d) adjusted goodness-of-fit index (AGFI), which should have values greater than .85 for acceptable and greater than .9 for good model fit; (e) Akaike Information Criterion (AIC), which is particularly useful when competing, though not necessarily nested, models need to be compared; as AIC values are not normed, the model with the lowest value should be preferred; (f) normed fit index (NFI), whose values should be greater than .9 for acceptable model fit and greater than .95 for good fit; (g) nonnormed fit index (NNFI), which should have values greater than .95 for acceptable and greater than .97 for good model fit; and (h) comparative fit index (CFI), which has critical values of the same magnitude as the NNFI.

It should be noted that the above-mentioned cut-off scores are merely rules of thumb and are being debated in the literature; for a comprehensive discussion of model fit and fit indices see, for example, Backhaus, Erichson, Plinke, and Weiber (2006), Homburg and Baumgartner (1998), Homburg and Giering (1998), Loehlin (2004), Reinecke (2005), Schermelleh-Engel, Moosbrugger, and Müller (2003), Schumacker and Lomax (1996), Steiger (1995), or Ullman (2001).

Multiple linear regression analyses is intended to be used to predict and explain the *direct* measures of the three determinants of behavioral intention (i.e., attitude toward the behavior, subjective norm, and perceived behavioral control) on the basis of their *indirect* measures (i.e., behavioral, normative, and control beliefs, respectively). The TPB as a behavioral model assumes that separately held beliefs, even contradicting ones, can be integrated into three single summarizing values that mirror the extent (a) to which individuals evaluate the behavior in question, (b) to which they experience social pressure to perform it, and (c) to which they believe to possess the means and opportunities to do so. These summarizing measures are represented by the sums of beliefs (i.e., sums of products; see above and chap. 2.3), which can easily be used for the purpose of *mere prediction* of their corresponding direct measures.

Yet, using the *sums* of beliefs to predict the direct measures will not allow for identification of *particular* beliefs that exert a significant positive or negative influence on their direct measures. But only when the researcher is able to identify predictors of the direct measures at the belief, or product, level, the opportunity will open up for *understanding* and *changing* the informational foundations of the determinants of the intention to ingest mineral water and, eventually, for changing intake behavior. Therefore, in order to retain maximum resolving power, regression analyses applied in this study used behavioral, normative, and control beliefs at the product level, not at the aggregate level, as predictors. This is in line with the concept of the TPB which does not suppose individuals to *actually perform* the process of mental integration of salient beliefs, it merely claims that this process can be *modeled* in such a fashion (e.g., Ajzen & Fishbein, 2000).

Different regression analyses were performed for each of the direct measures of the determinants of behavioral intention and also for volume of mineral water intake, which was to be predicted from weighted image components within the framework of the PWM. For each analysis, all related beliefs were entered simultaneously into the regression equation in one block. Multicollinearity among beliefs was checked beforehand, and it was made sure that tolerance values were at least greater than .3 for any belief. Analysis of results will focus on standardized regression coefficients (i.e., β

weights) to determine the relative weights of the beliefs for the prediction of their dependent measures.

Answers to Research Questions 12 and 13

12. Adequacy of the TPB

Research Question 12 asked whether the TPB was an adequate model for predicting and explaining interindividual variation in volume of mineral water intake. The TPB was visualized in Figure 2, which showed the complete structural model with all latent constructs (represented by ellipses). Figure 4 displays a reduced version of the TPB that does not include the indirect, belief-based variables any more, since their influence will not be investigated by means of SEM but by regression analyses.

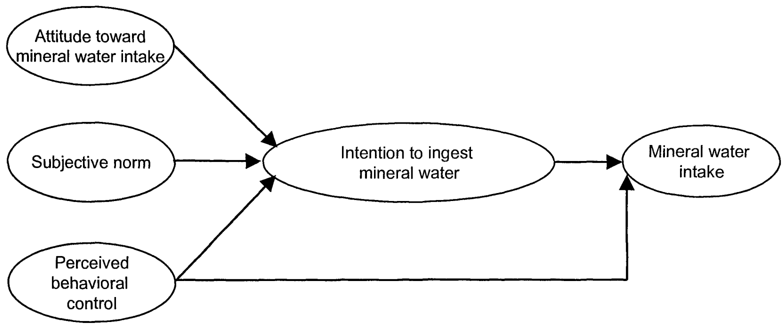

Figure 4. Reduced structural model of the theory of planned behavior (TPB).

Figure 5 shows the final path model of the TPB as was tested using SEM. It includes the observed indicators of the latent constructs of the reduced model (represented by rectangles) as well as their error variances and the residual variances of the endogenous constructs. Indicators are always supposed to be reflective, that is, their values are caused by the latent constructs they are assigned to, and not vice versa. While arrows indicate hypothesized directions of causal influence, curved doubleheaded arrows indicate exogenous constructs that are assumed to be correlated.

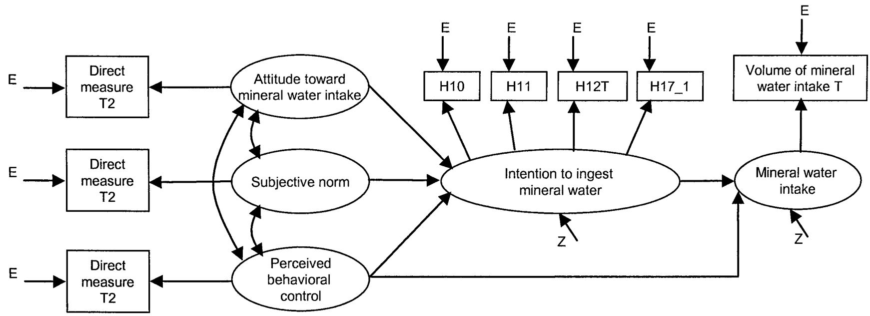

Figure 5. Path diagram of the theory of planned behavior (TPB).
E = Error of measurement; Z = Residual variance; T = Square-root transformed scores; T2 = Square transformed scores. H10 to H17_1 = Question / item numbers (For wordings and response formats see Appendix B1).

Figure 6 shows the same path model, but with estimated path coefficients. Variances of all variables, latent and manifest, were standardized. Note that when only one indicator was used to measure a latent variable, its path coefficient (i.e., factor loading) as well as its error variance were fixed beforehand on the basis of that indicator's empirically derived reliability, according to the principles reported above. As these coefficients were not estimated by the procedure, no significance test could be applied to establish how likely they were to be different from zero.

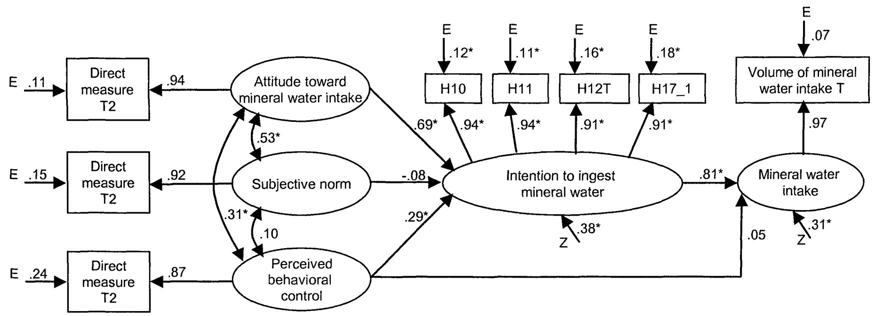

Figure 6. Path diagram with standardized coefficients for the theory of planned behavior (TPB). $N = 179$. E = Error of measurement; Z = Residual variance; T = Square-root transformed scores; T2 = Square transformed scores. H10 to H17_1 = Question / item numbers (For wordings and response formats see Appendix B1).
* $p < .05$.

Fit indices of this model suggest an acceptable, though not outstanding, fit: RMSEA = .11, RMS = .02, GFI = .92, AGFI = .85, AIC = 0.51, NFI = .95, NNFI = .95, and CFI = .97. The input matrix of intercorrelations for all indicators in the model as well as the matrix of standardized residuals can be found in Appendix D, Tables D6 and D7.

As can be seen from the high values of the path coefficients in the measurement model for the intention to ingest mineral water, all four items which the intention was measured with are very reliable indicators of the construct. Attitude toward mineral water intake turns out to be the strongest driver of the intention to ingest mineral water, followed by perceived behavioral control, while subjective norm does not exert any significant influence on it. Also, the direct path from perceived behavioral control to mineral water intake, reflecting the extent to which individuals have *actual* control over the behavior, is not significant; but intention is clearly a driver of mineral water intake. Residual variances (Z) of the intention to ingest mineral water and of mineral water intake imply that about two thirds of their variances (i.e., 1 - Z) are explained by their determinants. While attitude toward mineral water intake is significantly correlated with both subjective norm and perceived behavioral control, the latter two constructs are not mutually interrelated.

Because of that and because subjective norm is unrelated to behavioral intention, the subjective-norm component might as well be omitted from the model. Also, the path from perceived behavioral control to mineral water intake can be left out (i.e., fixed to 0), because it is not significant. The estimation procedure was rerun without these elements; results are shown in Figure 7.

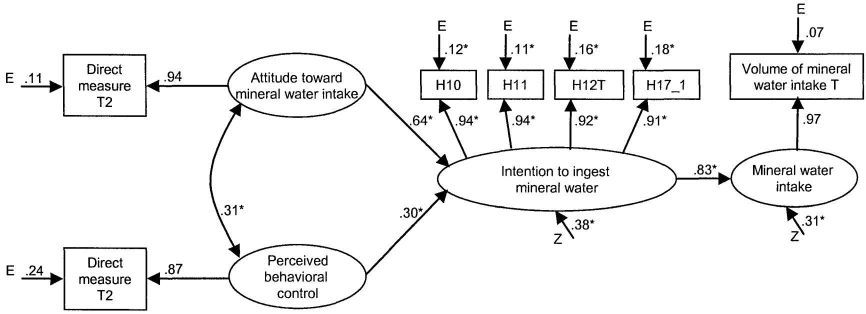

Figure 7. Reduced path diagram with standardized coefficients for the theory of planned behavior (TPB). $N = 179$. E = Error of measurement; Z = Residual variance; T = Square-root transformed scores; T2 = Square transformed scores. H10 to H17_1 = Question / item numbers (For wordings and response formats see Appendix B1).
$^* p < .05$.

Making the model more parsimonious (i.e., reducing its complexity by removing components and parameters), though, does not affect its basic interpretation: Attitude toward mineral water intake remains the most important driver of the intention to ingest it, compared to perceived behavioral control; 62% (i.e., 1 - .38) of the interindividual variance in the intention to ingest mineral water is explained by attitude and perceived behavioral control, while intention explains roughly two thirds (i.e., 1 - .31) of the variance in mineral water intake. Fit indices of this model, however, do not doubtlessly support a preference for the more parsimonious version: Though values for RMS, NFI, NNFI, and CFI remain unchanged, new values for RMSEA (.13), GFI (.91), and AGFI (.83) suggest that the fit has slightly deteriorated, while the lower value for AIC (.46), a fit index which is particularly useful when comparing competing models, implies a slight improvement of model fit.

Next, the informational foundations of the direct measures of the predictors of behavioral intention were scrutinized by means of multiple regression analyses, with the indirect, belief-based measures as predictors. Because subjective norm did not contribute significantly to the explanation of the variance in behavioral intention, it was decided to perform regression analyses only for attitude toward mineral water intake and perceived behavioral control.

It should be noted that in the following regression analyses both the independent and the dependent variables were observed *manifest* variables, while dependencies in SEM were modeled between unobserved *latent* variables, although they had been *measured* by manifest variables. As for the relevant predictors of the intention to ingest mineral water (i.e., attitude toward the behavior and perceived behavioral control), which are the *dependent* variables in the regression analyses that follow, manifest indicators of the latent constructs in SEM are *identical* with the dependent variables in the regression analyses.

All beliefs that were ascertained in this study were entered into the regression equations simultaneously, that is, 20 behavioral beliefs for the prediction of attitude toward mineral water intake and 10 control beliefs for perceived behavioral control. Results of the regression model for attitude toward the behavior are shown in Table 32; to keep the presentation of results as straightforward as possible, only beliefs with regression coefficients that are significantly different from zero are shown here (for intercorrelations of all 20 behavioral beliefs and the direct measure see Appendix D, Table D8).

Table 32

Regression Analysis Summary for Indirect, Belief-Based Measures of Attitude Toward Mineral Water Intake Predicting the Direct Measure

Predictor (belief): (Drinking) mineral water ...[a]	B[b]	$SE\ B$	β
fosters my health	73.07	13.86	0.35*
fosters my well-being	49.38	11.53	0.30*
does not contain vitamins	33.01	9.14	0.20*
is boring	18.57	7.25	0.15*

Note. Adjusted $R^2 = .56$ ($N = 179, p < .05$).
[a]For item wordings in German see Appendix B1, Questions H23 and H24. [b]Constant term and beliefs with nonsignificant regression coefficients omitted.
* $p < .05$.

More than half of the variance in the direct measure of attitude toward mineral water intake is explained by the model. Two of the beliefs have comparatively high explanatory power (i.e., high standardized regression coefficients): one that refers to the aspect of maintaining a person's health and another one that assumes that mineral water promotes general well-being. Put in other words, the more respondents believe that mineral water fosters their health and well-being, and the more positively they are inclined to evaluate these characteristics of a beverage in general, the more favorable their attitude toward mineral water intake tends to be.

Two other beliefs turn out to be significant predictors of the attitude toward the behavior too, though of comparatively lower magnitude in terms of their standardized regression coefficients; they refer to the potential of mineral water for making respondents feel bored and to the fact that is does not contain vitamins. These beliefs have positive regression coefficients, although both aspects had been named in the qualitative elicitation study as *disadvantages* of mineral water intake (see above and Appendix C, Table C2; see also chap. 4.2). This calls for an explanation.

All beliefs are made up of two optimally scaled components, which are multiplied together. When looking into the correlational structure of the beliefs, it was found that the *behavioral belief strength* of *is boring*, one of the two components, is strongly *negatively* correlated with the belief itself (r = -.77); and that the corresponding coefficient between the *outcome evaluation* of *is boring*, the other one of the two components, and the belief itself is also *negative* (r = -.40). In other words, the *less* respondents *agreed* with the statement *is boring* as a characteristic of mineral water (for scale anchors see Appendix B1, Question H23), and the *more* they found *boring* to be a *negative* characteristic of a beverage (the scale for outcome evaluation was anchored with 1 *negative* and 7 *positive*; see Appendix B1, Question H24), that is, the lower their scores on either of the two scales, the higher are the values of their beliefs.

At the interpretational level this means that the positive regression coefficient for the belief *is boring* indicates a statistical relationship with the attitude toward ingesting mineral water which masks the negative relationships of the belief itself with the items it is composed of. Thus, results are in line with intuitive expectations: The less respondents are convinced that mineral water is *boring*, and the more they evaluate *being boring* as a negative characteristic of a beverage, the more favorable their attitude toward ingesting mineral water tends to be. A similar relationship was found for the belief *does not contain vitamins*: The correlation coefficient of this belief with its behavioral belief strength was high and negative (r = -.83), while with outcome evaluation it was nonsignificant (r = .06).

Results of the regression model for perceived behavioral control are shown in Table 33; again, only beliefs with regression coefficients being significantly different from zero are presented (for intercorrelations of all 10 control beliefs and the direct measure see Appendix D, Table D9).

Table 33

Regression Analysis Summary for Indirect, Belief-Based Measures of Perceived Behavioral Control Predicting the Direct Measure

Predictor (belief): Expecting ...[a] for the next 7 days	B^{b}	*SE B*	β
to have mineral water available whenever and wherever I want to drink a beverage	17.43	5.00	0.32*
to have mineral water permanently available in my household	10.85	4.11	0.24*

Note. Adjusted $R^2 = .27$ ($N = 179, p < .05$).
[a]For item wordings in German see Appendix B1, Questions H29 and H30. [b]Constant term and beliefs with nonsignificant regression coefficients omitted.
* $p < .05$.

Only 27% of the variance in the direct measure of perceived behavioral control is explained by the model. There are two beliefs that have explanatory power, both of them refer to the aspect of availability of mineral water in the natural environments respondents were living in during the data collection period. The more ubiquitarily respondents were expecting to have mineral water available in their habitats, the more confident they were that they had the means and opportunities to ingest high volumes of it.

13. Adequacy of the TRA

This research question asked whether the TRA was an adequate model for the prediction and explanation of volume of mineral water intake. The TRA, as was explicated in chapter 2.3, was the forerunner version of the TPB and was aimed at modeling volitional behavior. It included only attitude toward the behavior and subjective norm as predictors of behavioral intention (see Figure 3), and is thus nested in the TPB.

Figure 8 displays SEM results for the TRA.

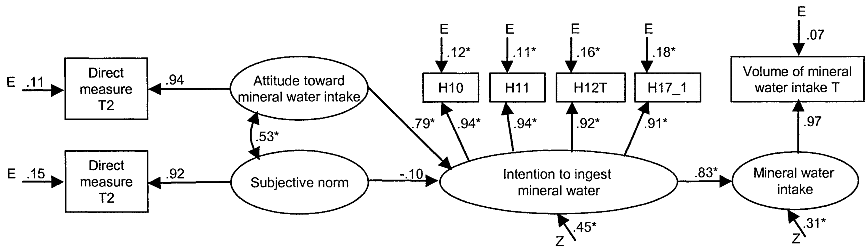

Figure 8. Path diagram with standardized coefficients for the theory of reasoned action (TRA). $N = 179$. E = Error of measurement; Z = Residual variance; T = Square-root transformed scores; T2 = Square transformed scores. H10 to H17_1 = Question / item numbers (For wordings and response formats see Appendix B1).
* $p < .05$.

Fit indices of the TRA also suggest an acceptable fit, though it is slightly worse than the fit of the TPB (see above): RMSEA = .13, RMS = .03, GFI = .91, AGFI = .83, AIC = 0.46, NFI = .95, NNFI = .95, and CFI = .97; on the other hand, the value for AIC implies a slight improvement of fit. There are two important differences in parameter estimates between the TPB and the TRA: (a) The path coefficient between attitude toward mineral water intake and behavioral intention is higher in the TRA, suggesting a stronger influence of the attitudinal component, but yet, (b) the share of explained variance in the intention to ingest mineral water is lower now (55% as opposed to 62% in the TPB, see Figure 6), because the influence of perceived behavioral control is missing. Subjective norm still has only negligible, nonsignificant influence on behavioral intention.

Item Analyses of Additional Variables

It was explicated earlier in this text (see chap. 2.3) that the TPB claims to cover all relevant sources of influence on an individual's behavior, either directly as model components or indirectly as distal determinants of the behavior, that is, as determinants that are indeed external to the TPB ("background factors", Ajzen, 2005a, p. 134, such as SES, traits, emotions, knowledge, media exposure, and the like) but whose impact is imagined to be mediated by the beliefs that underlie the predictors of behavioral intention (see also Conner & Armitage, 1998, 2002). When this study was set up, great pains were taken to avoid any sort of "cafeteria-style theorizing" (Bandura, 1997, p. 285) by arbitrarily adding new components to the TPB.

However, it did not seem to be necessary to maintain this restriction when physical characteristics of an individual's natural environment were suspected to influence his or her physiological processes. This is the case, for instance, when atmospheric conditions like warm air temperatures cause increased loss of body water and, subsequently, may trigger hypovolemic thirst, which may, in turn, cause homeostatic drinking in order to restore the set point of a body's water balance (see chap. 2.1). Such a behavioral pathway would need to make only little reference to psychological or socioscientific characteristics or processes.

Another situation where the addition of further components to the TPB appeared to be justifiable occurs when the TPB is applied simultaneously to another behavioral domain too, which may be hypothesized to causally influence the target behavior. In this case, the core TPB model that is aimed at explaining the target behavior may be extended to encompass fragments of another TPB model that is applied to the other domain. Such an extended TPB model has only rarely been used before, if at all, and it seemed to be most promising to test it when there is also a physiological relationship between the two behavioral domains as in the case of physical activities, which may also lead to a substantial loss of body water that needs to be replenished (see chap. 2.2).

In this study, weather parameters as well as the times respondents spent on physical work or labor and on physical exercise were recorded for every day of the data collection period and were then intraindividually aggregated at the analysis stage (see above). Moreover, the *intentions* to get physical exercise and to work physically during the data collection period were ascertained in the premeasurement session and so was the *attitude toward getting physical exercise*. Figure 9 shows how these additional components were integrated into the previously tested TPB model for mineral water intake (see above).

First, the weather, measured as the sum of maximum and minimum air temperatures, which are the most promising of the weather parameters obtained and processed in this study (see chap. 5.3), is hypothesized to impact mineral water intake directly, without any mediating components between them. Second, the attitude toward getting physical exercise, the intention to get physical exercise, and the extent to which physical exercise was actually taken during the data collection period were interrelated in quite the same fashion as the corresponding components that are related to mineral water intake; this applies also to physical work or labor, but here no indicators for the attitude toward the behavior were ascertained. The attitude toward getting physical exercise was also expected to be correlated with the attitude toward mineral water intake. Third, it is hypothesized that the intentions to perform either of the two physical activities have an impact on the intention to ingest mineral water, because if respondents intend to perform them in the forthcoming 7 days, they might also anticipate an increased need of fluid supply and might thus have an increased intention to ingest mineral water. Forth, the extent to which individuals actually take physical exercise or to which they work physically may influence the volume of ingested mineral water because of the physiological relationship between both behavioral domains. Paths were added accordingly to the core TPB model to be estimated. Again, when there was only one indicator available for a latent construct, its loading and error variance were fixed beforehand.

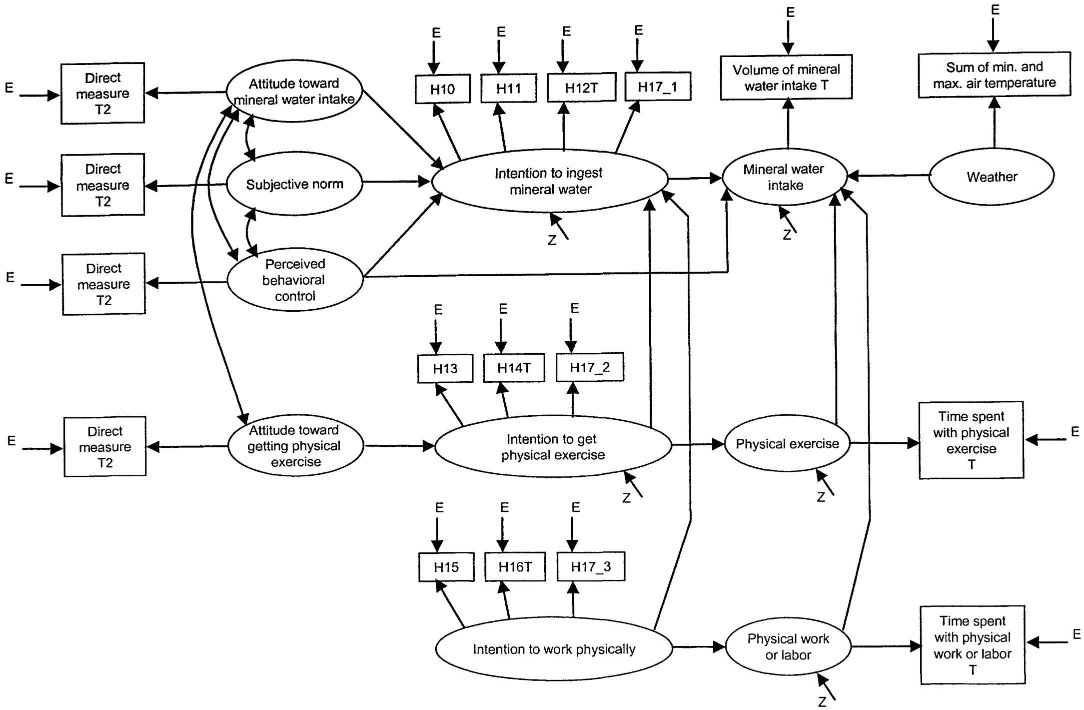

Figure 9. Path diagram of an extension of the theory of planned behavior (TPB).
E = Error of measurement; Z = Residual variance; T = Square-root transformed scores; T2 = Square transformed scores. H10 to H17_3 = Question / item numbers (For wordings and response formats see Appendix B1).

Results of item and scale analyses related to the new model components will be described in the sections that follow; afterwards, SEM results for the extended version of the TPB will be reported.

The Weather

The potential influence of the weather and particularly of the air temperature on volume of mineral water intake was hypothesized early at the outset of this study so that it will be incorporated into the extended TPB model now, although the hope to detect an impact of the air temperature on volume of mineral water intake by means of SEM may seem to be too optimistic given the nonsignificant bivariate correlation coefficients between them reported in Table 17. In the same table, additional descriptive information about all weather parameters analyzed in this study has been given too.

It will be remembered that both minimum and maximum air temperatures were obtained for every day of the data collection period and were then intraindividually averaged to obtain one score each for every respondent; these scores reflected the average daily minimum and maximum air temperatures, respectively, that an individual was exposed to during the data collection period. Though the minimum air temperature is less likely than the maximum temperature to influence volumes of fluid intake in a causal sense, the strong *inter*individual correlation between the two intraindividually averaged temperatures (r = .92) suggested that the minimum temperature could be considered simply, in a psychometric sense, as a repeated measurement of the maximum temperature.

Thus, this correlation coefficient could be considered as an estimate of the reliability of the sum of both temperatures which will be used as an indicator of the weather construct in the extended TPB model. Its reliability was upgraded according to the Spearman-Brown prophecy formula (e.g., Lienert, 1989, p. 221)

$$r_{tt} = 2\, r_{12} \,/\, (1 + r_{12}), \qquad (8)$$

where r_{tt} is a test's corrected estimate of reliability and r_{12} is the empirical correlation between both of its halves (i.e., the intraindividually averaged scores for minimum and maximum air temperatures, respectively), to derive an estimate of the path coefficient. The value of r_{tt} was .96 for the sum of both temperatures.

Physical Exercise

The internal structure of the extent to which respondents spent time on physical exercise during the data collection period, including the time they may have spent in a sauna, has not been reported as yet. Total times of physical exercise per day were recorded as hours and minutes; prior to analyses, minutes were converted into decimal fractions of an hour and were then intraindividually aggregated across the 7 days. Again, as was done with volumes of mineral water intake (see above), it seemed to be reasonable to rearrange the temporal order of the recorded times of exercise from day 1 to day 7 of an individual's data collection period to the natural sequence of the days from Monday to Sunday so that the times spent on physical exercise on, for instance, all Thursdays were fed into one variable.

Table 34 shows the times that respondents spent on physical exercise on different days of the week. No remarkable differences between the days emerge; the average time spent on a working day (i.e., Monday to Friday) is nearly the same ($M = 0.28$ hrs) as on a Saturday or Sunday ($M = 0.26$ hrs); in other words, respondents exercised for a little bit more than a quarter of an hour per day on average.

Table 34

Psychometric Properties of Times Spent on Physical Exercise (hrs) for the Days of the Week

Time spent on a ...	*M*	*SD*	r_{it}^{a}
Monday	0.29	0.61	.28
Tuesday	0.28	0.61	.21
Wednesday	0.33	0.67	.10
Thursday	0.29	0.71	.18
Friday	0.23	0.56	.24
Saturday	0.24	0.72	.33
Sunday	0.27	0.63	.25

Note. 168 <= *N* <= 178.

[a]Corrected day-total correlation.

Yet, contrary to the findings related to mineral water intake (see Tables 19 and 20), all correlations between exercise on a particular day and the sum of all other days (i.e., corrected day-total correlations; see Table 34) are quite low and so are most of the correlation coefficients between all possible pairs of days (see Table 35). The only coefficients of substantial size are those between Monday and Friday and between Saturday and Sunday, but not, interestingly, between the pairs of adjacent days Friday and Saturday or Sunday and Monday, respectively.

Table 35

Intercorrelations for Times Spent on Physical Exercise Between the Days of the Week

Volume on a ...	1	2	3	4	5	6	7
1. Monday	-						
2. Tuesday	.12	-					
3. Wednesday	.03	.15*	-				
4. Thursday	.11	.11	.02	-			
5. Friday	.39*	-.04	.11	.18*	-		
6. Saturday	.16*	.16*	.00	.11	.08	-	
7. Sunday	.07	.12	.04	.03	.02	.46*	-

Note. $N = 168$.
* $p < .05$.

In order to establish the temporal stability of the composite measure of the time spent on physical exercise, which will serve as an estimate of its reliability, the split-half reliability coefficient was preferred to Cronbach's α because, obviously, the time spent on one day is, in general, not very predictive of the time spent on another day or in total. Therefore, the days of the week were split into two halves in alternating order of the days, so that when one day belonged to one half, the following day was assigned to the other half, and so on; also, it was made sure that Monday was not put into the same half as Friday and Saturday not in the same half as Sunday. The resulting split-half reliability coefficient is $r_{tt} = .55$ after it was upgraded according to formula (8).

In addition to the *time* respondents spent on physical exercise during the data collection period and the *intention* to get physical exercise in that period (see below), a direct measure of an individual's *attitude* toward getting physical exercise was obtained in the premeasurement session too. Very similar to how the direct measure of the attitude toward mineral water intake was ascertained (see above), eight items were administered, which purported to measure the attitude toward getting physical exercise and which had changing evaluative directions of their wordings (for item wordings see Appendix B1, Question H19). They referred to a participant's physical exercising behavior during the next 7 days and used nearly the same wordings as those items that were employed to obtain the attitude toward mineral water intake. Response format was a 7-point rating scale that ranged from 1 (strongly disagree) to 7 (strongly agree). Hence, summated ratings of the direct attitude measure could range from 8 to 56 points with higher scores indicating a more favorable attitude toward getting physical exercise in the forthcoming 7 days. Psychometric properties of these items are reported in Table 36. Item numbering follows the sequence in which they appear on the questionnaire. Cronbach's α for the scale is .87.

Table 36

Psychometric Properties of the Items of the Direct Measure of Attitude Toward Getting Physical Exercise

Item Number[a]	*M*	*SD*	r_{it}[b]
1	6.07	1.48	.68
2 (R)	6.49	1.18	.55
3 (R)	5.46	1.82	.58
4	6.21	1.22	.68
5 (R)	6.17	1.25	.57
6 (R)	5.55	1.81	.70
7	5.92	1.38	.55
8	5.50	1.66	.68

Note. N = 179. Response format: 7-point rating scale (ranging from 1 to 7). (R) = Reversed item.

[a]Items are numbered according to their appearance on the questionnaire (see Appendix B1, Question H19). [b]Corrected item-total correlation.

Physical Work or Labor

Similar to physical exercise, the total times that respondents spent on physical work or labor per day were recorded during the data collection period as hours and minutes; minutes were also converted into decimal fractions of an hour at the analysis stage, and total times were then intraindividually aggregated across the 7 days. Physical work or labor encompassed physically demanding occupational activities or activities related to the household or garden. In case of doubt, it was left to the participants to decide whether to record times of strenuous transportation (like walking, bicycling) and the like, if any, as labor or as physical exercise, depending on how they primarily experienced these activities (see chap. 5.1). The temporal order of the recorded total times of physical work or labor per day were again rearranged from day 1 to day 7 of an individual's data collection period to the natural sequence of the days from Monday to Sunday (for details of the procedure see above).

Table 37 shows the times that respondents spent on physical work or labor on different days of the week. These data suggest that students tend to spend less time working physically from Sunday to Tuesday compared to the rest of the days with Friday being clearly the day were the maximum amount of time is spent on physical work or labor. On average, respondents spent ca 50 minutes per day working physically (M = .84 hrs).

Table 37

Psychometric Properties of Times Spent on Physical Work or Labor (hrs) for the Days of the Week

Time spent on a ...	*M*	*SD*	r_{it}^{a}
Monday	0.68	2.00	.59
Tuesday	0.65	1.91	.49
Wednesday	0.85	2.28	.52
Thursday	0.71	1.84	.37
Friday	1.36	2.58	.63
Saturday	0.95	2.02	.31
Sunday	0.66	1.74	.27

Note. $173 <= N <= 179$.

[a]Corrected day-total correlation.

Correlation coefficients between the times spent on physical work or labor on a particular day and the sum of all other days (i.e., corrected day-total correlations; see Table 37) are generally higher than for physical exercise (cf. Table 34), suggesting that physical work or labor is a more regularly performed behavior than physical exercise.

Correlation coefficients between all possible pairs of days (see Table 38) reveal that times engaged in physical work or labor on a Monday or Friday are predictive of the times spent on all other days including Saturday and Sunday, though to varying degrees of explained variance. The time spent on physical work or labor on one day of the weekend is substantially correlated with that of the other day of the weekend and lower, yet still significantly, with the times spent on the days adjacent to the weekend, but nonsignificantly with the times spent on a Tuesday, Wednesday, or Thursday. Overall, times spent on physical work or labor tend to be substantially correlated among working days (i.e., Monday to Friday) and between Saturday and Sunday, but not so much between a working day and a day of the weekend. The split-half reliability coefficient (r_{tt} = .76), which quantifies temporal stability of the composite measure of the time spent on physical work or labor, was derived in a similar way as that for physical exercise (see above) and was upgraded according to formula (8) too.

Table 38

Intercorrelations for Times Spent on Physical Work or Labor Between the Days of the Week

Volume on a ...	1	2	3	4	5	6	7
1. Monday	-						
2. Tuesday	.48*	-					
3. Wednesday	.56*	.54*	-				
4. Thursday	.22*	.33*	.18*	-			
5. Friday	.44*	.41*	.45*	.46*	-		
6. Saturday	.29*	.01	.08	.14	.29*	-	
7. Sunday	.17*	.00	.12	.06	.26*	.44*	-

Note. N = 173.

* $p < .05$.

Scale Analyses of Additional Variables

As can be seen from Figure 9, there were 10 indicators which the additional model components were measured with: (a) 1 indicator each for the weather and the attitude toward getting physical exercise, (b) 3 indicators each for the intention to get physical exercise and for the intention to work physically, and (c) 1 indicator each for the extent to which physical exercise and physical work or labor were actually performed during the data collection period. Distributional properties of the latter 2 indicators before and after square-root transformation were already reported (see Tables 11 and 12).

The 3 items that were aimed at measuring respondents' *intention to get physical exercise* were very similar to those that were used to measure the intention to ingest mineral water (see above), and they were also administered in the premeasurement session (see Appendix B1): (a) number of days in the forthcoming week on which respondents intended to get physical exercise (Question H13, scale ranging from *0* to *7 days*), (b) the total time they intended to get physical exercise over the next 7 days (Question H14, open-ended response format where the estimated time had to be inserted as hours and minutes), and (c) the intention to get very much physical exercise during the forthcoming 7 days (Question H17, Item 2; 7-point rating scale ranging from 1 *strongly disagree* to 7 *strongly agree*). The 3 items that were meant to measure the *intention to work physically* were very similarly worded and had identical response formats (see Appendix B1, Questions H15, H16, and H17, Item 3). An overview of distribution parameters of the remaining eight predictors is given in Table 39.

Table 39

Additional Measures Used in the Theory of Planned Behavior (TPB)

Variable	*M*	*SD*	Skewness[a]	Kurtosis[b]
Number of days of intended physical exercise[c]	1.94	1.69	0.64	-0.10
Intended total time of physical exercise (hrs)[c]	2.86	2.95	1.80	5.34
Intention to get very much physical exercise[c]	2.85	1.82	0.60	-0.77
Number of days of intended physical work or labor[c]	2.42	1.82	0.75	-0.02
Intended total time of physical work or labor (hrs)[c]	8.85	11.35	2.12	4.38
Intention to work physically very much[c]	2.74	1.53	0.85	0.12

(Table 39 continues)

(Table 39 continued)

Variable	*M*	*SD*	Skewness[a]	Kurtosis[b]
Attitude toward getting physical exercise				
(direct measure)	47.39	8.59	-1.40	1.99
Sum of minimum and maximum temperature (°C)	19.38	8.99	0.09	-1.23

Note. $N = 179$.

[a]$SE = 0.18$. [b]$SE = 0.36$. [c]For item wordings see Appendix B1, Question H13 to Question H17, Item 3.

As was the case with the times that respondents actually spent on physical exercise or on physical work or labor, respectively, during the data collection period (see Table 11), the estimates of the total times respondents *intended* to devote to any of these activities are positively skewed to a degree that calls for square-root transformation, while the direct measure of the attitude toward getting physical exercise, like the corresponding measure related to mineral water intake (see Table 30), might need square transformation of its raw scores due to the negatively skewed distribution, in order to make the distributions less deviating from normality. Improved distribution parameters of these variables after transformation are shown in Table 40. Correlation coefficients between the original measures and their transformed counterparts ranged from $r = .92$ to $r = .99$.

Table 40

Transformed Additional Measures Used in the Theory of Planned Behavior (TPB)

Variable	*M*	*SD*	Skewness[a]	Kurtosis[b]
Intended total time of physical exercise (hrs)[c] T	1,37	1,00	-0,01	-0,65
Intended total time of physical work or labor (hrs)[c] T	2,43	1,72	0,79	0,37
Attitude toward getting physical exercise (direct measure) T2	2318,83	719,54	-0,85	0,11

Note. $N = 179$. T = Square-root transformed scores. T2 = Square transformed scores.
[a]$SE = 0.18$. [b]$SE = 0.36$. [c]For item wording see Appendix B1, Question H14 and H16.

Answer to Research Question 14

14. An Extension of the TPB

Figure 10 shows the path diagram with standardized coefficients for the extended version of the TPB; several aspects of the results are noteworthy. Neither sizes and signs of the coefficients in the core TPB model (see the upper part of Figure 10) nor residual variances of the endogenous variables (i.e., intention to ingest mineral water as well as mineral water intake) have changed to a relevant degree (cf. Figure 6), which corroborates the basic findings formulated for the TPB (see above Research Question 12). TPB model fragments for physical exercise and for physical work or labor function pretty well too (see the lower part of Figure 10): indicators for the intention constructs (i.e., Questions H13 to H17, Item 3) have high loadings, the attitude toward getting physical exercise is able to explain a major share of the variance in the intention to perform physical exercise (17%), and the intention constructs themselves explain roughly 80% of the variances in their respective behaviors.

No relationships could be established, however, between the *intentions* to perform physical exercise or to work physically and the *intention* to ingest mineral

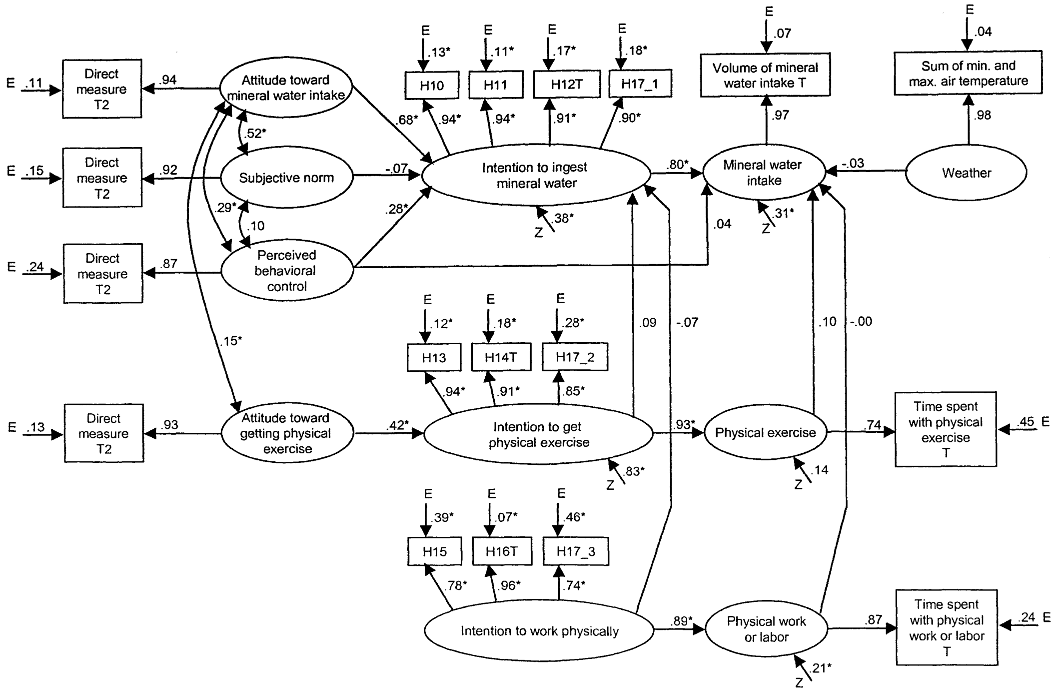

Figure 10. Path diagram with standardized coefficients for an extension of the theory of planned behavior (TPB).
$N = 179$. E = Error of measurement; Z = Residual variance; T = Square-root transformed scores; T2 = Square transformed scores. H10 to H17_3 = Question / item numbers (For wordings and response formats see Appendix B1).
* $p < .05$.

water. Also, there are no significant relationships between the *times actually spent* on physical exercise or on physical work or labor and *actual volume* of mineral water intake, although the path coefficient for physical exercise (.10, p = .06) only narrowly fails to surpass the α level of .05. Moreover, the weather, operationalized as air temperature, has no significant influence whatsoever on mineral water intake.

Overall, fit indices of the extended model do not suggest an improvement compared to the core TPB model's fit (see Research Question 12), which was considered acceptable but not excellent (fit indices of the core TPB model are repeated in parentheses): RMSEA = .06 (.11), RMS = .05 (.02), GFI = .88 (.92), AGFI = .85 (.85), AIC = 1.61 (0.51), NFI = .91 (.95), NNFI = .96 (.95), and CFI = .97 (.97). The input matrix of intercorrelations for all indicators in the extended model as well as the matrix of standardized residuals can be found in Appendix D, Tables D10 and D11. Standardized residuals equal or greater than .1 (see Appendix D, Table D11), which were not found for the core TPB model (see Appendix D, Table D7), indicate relationships between manifest variables which are not appropriately modeled in the extended version of the TPB.

Preparation of Variables in the PWM

Similar to the TPB and TRA, the PWM is formally an application of expectancy-value theory; it claims that an individual's decision for a particular food product in a given situation depends on an array of motives, which the person weights according to his or her situation-specific needs and preferences (see chap. 2.3). In order to predict a person's actual volume of mineral water intake by means of the PWM, two measures were obtained: (a) the *evaluation of a specific situation* in terms of how important each of a list of salient attributes is for the intake of a beverage in that situation (e.g., "When deciding on the usage of a beverage during the next 7 days, *I will not care at all* vs. *I will consider it to be extremely important to me* whether it fosters my health"; see Appendix B1, Question H25; 7-point rating scale); and (b) a corresponding list of *image components* of mineral water, which are the strengths of a person's beliefs that mineral water does have the attributes in question or that ingesting it will lead to specific outcomes (e.g., "Mineral water fosters my health"; see Appendix B1, Question H23; 7-point rating scale).

In this study, the notion of a situation was not referring to a clearly defined situational context or to a particular spatiotemporal address, rather it was broadened to encompass the totality of the natural environment that a respondent was living in during the 7-day data collection period. And the strengths of salient behavioral beliefs, which were assessed for use within the framework of the TPB and TRA (see above), were also employed in the context of the PWM as salient image components of mineral water (see chap. 2.3 for a discussion of the different beliefs demanded by the TPB and TRA and by the PWM and how they were operationalized in this study). Put in other words, both the behavioral belief strengths that performing mineral water intake behavior will lead to specific outcomes, as they were required in the context of the TPB and TRA, and the strengths of the beliefs related to mineral water as an object (i.e., the image components), as required by the PWM, utilized the same set of 20 items of Question H23.

Corresponding items of both types (i.e., from Questions H23 and H25) were then multiplied together, and all 20 products (i.e., *weighted* image components) were eventually entered simultaneously into a regression analysis according to formula (6) with square-root transformed volume of mineral water intake as the dependent variable (note that the order of items at Question H23 is different from H25). But before this was done, raw scores of the image components of mineral water (Question H23) were bipolarized by subtracting 4 from each individual score (with rescaled scores thus ranging from -3 to +3), while the scores of the attributes of the evaluation of the situation (i.e., the 7-day data collection period; Question H25) were left unchanged (i.e., ranging from 1 to 7). This procedure follows a suggestion made by Pudel and Westenhöfer (2003, p. 318). Afterwards, optimal scaling (see above and chap. 2.3) was applied to the raw scores according to formulae (3) to (5).

In order for the raw scores to become optimally scaled, square-root transformed volume of mineral water intake was regressed on (a) the sum of all items measuring the image components of mineral water (i.e., the belief strengths), (b) the sum of all attributes evaluating the situation (i.e., the 7-day data collection period), and (c) the sum of the products of corresponding items from both dimensions, that is, the sum of the weighted image components. Regression analysis results are summarized in Table 41.

Table 41

Regression Analysis Summary for the Components in Pudel and Westenhöfer's Model (PWM) Predicting Square-Root Transformed Volume of Mineral Water Intake

Predictor	B^a	*SE B*	β
Sum of image components	-0.03	0.02	-0.33
Sum of attributes of the evaluation of the situation	-0.02	0.01	-0.27*
Sum of products (weighted image components)	0.01	0.00	0.87*

Note. Adjusted $R^2 = .15$ ($N = 179, p < .05$).

[a]Constant term omitted.

* $p < .05$.

Then all items were optimally rescaled at the individual level according to formulae (3) to (5), and items and products were aggregated again. Results of the regression analysis with rescaled measures are shown in Table 42. As was the case for the indirect measures in the TPB (see above), the unstandardized coefficient for the sum of products as well as adjusted R^2 remains unchanged (for intercorrelations of all seven variables used in the present context see Appendix D, Table D12).

Table 42

Regression Analysis Summary for Optimally Scaled Components in Pudel and Westenhöfer's Model (PWM) Predicting Square-Root Transformed Volume of Mineral Water Intake

Predictor	B^a	*SE B*	β
Sum of image components	-0.00	0.01	-0.00
Sum of attributes of the evaluation of the situation	-0.00	0.00	-0.00
Sum of products (weighted image components)	0.01	0.00	0.40*

Note. Adjusted $R^2 = .15$ ($N = 179, p < .05$).

[a]Constant term omitted.

* $p < .05$.

Answer to Research Question 15

15. Adequacy of the PWM

All 20 weighted and optimally scaled image components that were described above were entered into a regression equation simultaneously, where square-root transformed volume of mineral water intake served as the dependent variable. Results of the regression model are shown in Table 43; image components that are not significantly different from zero are omitted again (for intercorrelations of all 20 image components and mineral water intake see Appendix D, Table D13).

Table 43

Regression Analysis Summary for Weighted Image Components in Pudel and Westenhöfer's Model (PWM) Predicting Square-Root Transformed Volume of Mineral Water Intake

Weighted image component (belief): (Drinking) mineral water ...[a]	B[b]	$SE\ B$	β
is free of calories	0.07	0.03	0.24*
fosters my well-being	0.04	0.02	0.19*
fosters my health	0.06	0.03	0.19*

Note. Adjusted $R^2 = .26$ ($N = 179, p < .05$).
[a]For item wordings in German see Appendix B1, Questions H23 and H25. [b]Constant term and beliefs with nonsignificant regression coefficients omitted.
* $p < .05$.

About a quarter of the variance in manifest mineral water intake is explained by the model. There are two image components with significant regression coefficients, which have the same contents as those that were found to be predictors of the direct measure of the attitude toward mineral water intake in the framework of the TPB (see above): the aspects of maintaining a person's health and well-being. The more respondents believe that mineral water fosters their health and well-being, and the more they are convinced that these are characteristics of a beverage in general that are important to them when deciding on the usage of a beverage during the data collection period, the more volume of mineral water they are inclined to ingest. Even more importantly, the calorie-free character of mineral water emerges as an additional intake-facilitating image component.

Results III: Summary and Preliminary Conclusions

The TPB has been proven to be an adequate model for the prediction and explanation of interindividual variation in volume of mineral water intake. Though global indices do not suggest that the TPB fits the empirical data extraordinarily well, it seems to work satisfactorily. Being a complex model, it does not only explain nearly 70% of the variance in mineral water intake as a latent construct, which is free of error of measurement, but it also contributes to an in-depth understanding of the drivers of intake by interrelating several behavioral determinants in a causal way. The intention to ingest mineral water turns out to be the main source of influence on actual intake; and the more favorable a respondent's attitude toward mineral water intake tends to be and the more confident a person is that he or she has the means and opportunities to ingest high volumes of mineral water, the stronger is the intention to enact intake behavior. Subjective norm, however, does not contribute to the formation of the intention to ingest mineral water.

The informational foundation of the attitude toward mineral water intake is mainly made up of two behavioral beliefs which refer to the aspects of fostering one's health and one's well-being. Both these aspects have a broad bandwidth as they refer to very global outcomes of the behavior, and they are closely related to each other (empirical correlation between both beliefs: $r = .47$, $p < .05$; see Appendix D, Table D8): If an individual feels well, he or she may be assumed to be in a generally healthy condition, and if someone is in good health, he or she is likely to feel well. The more respondents believe that mineral water fosters their health and well-being, and the more positively they are inclined to evaluate these characteristics of a beverage in general, the more favorable their attitude toward mineral water intake tends to be.

Perceived behavioral control is predicted by two control beliefs both of which refer to the aspect of availability of mineral water in a person's natural environment. The more respondents are expecting to have mineral water available whenever and wherever they want to drink a beverage during the 7-day data collection period, and the more they are expecting to have it permanently available in their households in that period, the more confident they are that they have the means and opportunities to ingest high volumes of mineral water.

While the behavioral beliefs are able to explain about half of the variance in the direct measure of attitude toward the behavior, control beliefs explain less than that but still a substantive share (about a quarter) of the variance in the direct measure of perceived behavioral control.

Not unsurprisingly, the TRA, which is nested in the TPB and is thus more parsimonious, is indeed applicable to mineral water intake behavior and its determinants too. But, regardless of whether the minor differences in fit indices observed between both models indicate a general superiority of one over the other, the TRA is only able to keep up with the TPB in terms of explained variance in volume of mineral water intake, but it cannot catch up with it in terms of explained variance in behavioral intention (cf. Figures 6 and 8). Thus, perceived behavioral control (within the framework of the TPB) is adding relevant information to the comprehension of the drivers of mineral water intake. In other words, mineral water intake is better comprehensible when being understood as a nonvolitinal behavioral act (modeled by means of the TPB) instead of a behavior under complete volitional control (as in the TRA).

Extending the TPB to encompass the influence of the weather (i.e., the air temperature) and fragments of TPB applications to physical activities does not lead to a model that is able to explain variance in volume of mineral water intake over and above the share explained by the core model alone. Rather the shares of explained variances are the same both for mineral water intake and behavioral intention (cf. Figures 6 and 10), while relevant fit indices (most of all AIC) indicate a deteriorated overall fit of the extended model. Yet, when looking merely at the TPB model fragments for physical exercise and physical work or labor (see Figure 10), they are found to work adequately in terms of path coefficients, explained variances in the latent constructs, and loadings of indicator variables. Given the fact that neither the weather nor physical work or labor had an influence on mineral water intake when being analyzed separately at the level of manifest variables (see Research Questions 8 and 10 above), the nonexistence of influence of these factors in SEM is not surprising. On the other hand, physical exercise could have been expected to have a significant influence on mineral water intake in SEM given the findings related to Research Question 8 (see above), but it turned out not to have an impact. Still it should be appreciated that the respective path coefficient (.10, p = .06), though of very low explanatory power, only narrowly fails to break the .05 α level.

The PWM is formally similar to the expectancy-value part of the TPB, but it is of much less complexity as it assumes a direct behavioral path from individually and situationally weighted image components of mineral water (i.e., beliefs) to its intake. The nonweighted image components in the PWM are identical with the behavioral belief strengths used in the TPB, but the factors by which they are weighted are different in both models. Also, there are different dependent variables for them to predict, in the TPB it is the direct measure of the attitude toward the behavior, in the PWM it is the target behavior. But still, it is not very surprising to find the same significant predictors in both the TPB and PWM: fostering one's health and one's well-being. In the framework of the PWM, the calorie-free character of mineral water also emerges as a relevant predictor.

The important difference between both models lies in their power to predict and explain interindividual variation in mineral water intake. In the TPB, behavioral beliefs explain about half of the variance in the *manifest* direct measure of attitude toward the behavior, which, as a *latent* dimension, explains a major share of variance in the *latent* dimension intention to ingest mineral water, which explains most of the variance in the *latent* variable mineral water intake. In the PWM, weighted image components are merely capable of explaining about a quarter of the variance in *manifest* mineral water intake. Hence, the PWM does appear to be able to predict and explain mineral water intake too, but it does not accomplish this task as successfully as the TPB, neither in terms of predictive power nor in terms of shedding light on the mental processes that underlie and precede the target behavior.

It may be argued, though, that correlations between manifest variables are necessarily of lower size than those between corresponding latent variables, because the former carry variance due to error of measurement which attenuates empirical correlation coefficients. Therefore, when the PWM tries to explain variance in *manifest* mineral water intake, it may not be expected to achieve a level of explanation that is equal to that which is achieved when error-free variance is modeled. However, since 93% of the variance in *manifest* volume of mineral water intake was found empirically to be true-score variance, the difference between 26% explained variance in the PWM (see Table 43) and 69% (i.e., 1 - Z) achieved by the TPB (see Figure 6) is unlikely to be rooted exclusively in the psychometric difference between manifest and latent variables, that is, in the contamination of empirical values with error of measurement. Rather the TPB is likely to be superior to the PWM in explaining variance in mineral water intake because it hypothesizes important mediating variables between an individual's beliefs and his or her behavior.

CHAPTER SIX

Discussion and Conclusions

This study has been conducted with the purpose of adding a piece of empirically derived information to the existing knowledge in the field of everyday beverage intake behavior. It tried to understand the obvious interindividual differences in volume of mineral water that ordinary people drink day-by-day in their natural environments, and it drew upon available psychological theories, models, concepts, instruments, and methods to attain this goal. Its objective was defined as a checkup of the usefulness of a number of person- and situation-related determinants that can be expected on theoretical grounds to have at least some capacity for contributing to the analysis of variance in mineral water intake. The study's legitimation was derived from its potential to pave the way for intervention programs that aim at changing nutrition behavior and to help answering one of the key questions raised at the 1975 Dahlem conference in Berlin, Germany: "Why do we eat, what we eat?" (Pudel & Westenhöfer, 2003, p. 20; see also chap. 3).

The final section of this text is organized around five topics: (a) the study's capability to provide an answer to the latter question with regard to mineral water intake, (b) some critical comments on the TPB as an adequate model for mineral water intake, (c) a short review of the methodology employed in this study, (d) an outline of the study's ability to open up an avenue for interventions aimed at increasing volume of mineral water intake, and (e) an outline of additional and complementary research into mineral water intake that may be desirable to be carried out in the future.

6.1 Determinants of Mineral Water Intake

Person-Related Determinants

With regard to the effect of isolated person-related determinants on mineral water intake that were investigated in this study (see chap. 3, Research Questions 1 to 8), the present results are not very encouraging. In addition to the findings derived by Diehl and his colleagues (Diehl, 1980, 1993; Diehl & Paul, 1985; Diehl, Paul, & Daum, 1984) and by other authors (Ajzen,2005a; Pudel & Westenhöfer, 2003), who concluded that broadband personality traits may not be expected to be predictive of nutrition behavior or of its potential outcomes such as overweight or obesity (cf. chap. 2.2), the present results do not lend much support to the idea that person-related, trait-like dispositions, even when they are of narrow bandwidth and when they are clearly related to nutrition behavior (like, e.g., dietary restraint, variety-seeking tendency, food neophobia), help to predict aggregated volume of mineral water intake recorded in naturalistic settings over a period of 7 days.

Of all the person-related predictors tested in this study, food neophobia measured with the FNS may have been regarded as the least plausible to be related to mineral water intake, despite some of the findings reviewed in chapter 2.2, since this concept refers to the willingness to try *novel* foods, which mineral water is unlikely to belong to given its widespread availability and its frequency of actual usage (see Figure 1 and cf. chap. 1.3). Consequently, no relationship between food neophobia and mineral water intake is found in this study. But quite in line with the idea that more neophobic persons tend to be more reluctant to try new beverages and may thus tend to satisfy their (lower) intrinsical need for variety in the choice of beverages by alternating between a smaller number of different products, their relevant sets identified in this study (i.e., the number of different beverages that respondents used during the data collection period) are indeed slightly, though significantly, smaller than those of less neophobic persons.

Being negatively correlated with the FNS (r = -.76, p = .00), the VARSEEK-scale that measures variety-seeking tendency, a trait that may cause intrinsically motivated variety-seeking behavior in relation to food, is related significantly neither to volume of total beverage intake nor to the relevant set, and not to volume of mineral water intake either. As variety-seeking behavior is assumed to be more likely to be triggered by food products that vary clearly in their sensory profiles like different *types* of beverages as opposed to, for instance, different *brands* of mineral water (e.g., van Trijp, 1994; see also Inman, 2001; van Trijp, Lähteenmäki, & Tuorila, 1992), it was hypothesized that participants with high scores on the VARSEEK-scale might have had larger relevant sets of beverages and, in consequence, might have recorded higher volumes of total beverage intake but smaller volumes of mineral water intake.

While such relationships could not be pinned down at the .05 α level, a look at the type I error rate for the relevant set reveals that persons scoring high on the VARSEEK-scale (i.e., approximately at the level of the upper quartile Q_3 or above) tend to have a relevant set that is *numerically* larger by nearly 1 beverage on average (with a comparatively low error rate: t = -1.56, p = .12) compared to those scoring low on the scale (i.e., approximately at the level of the lower quartile Q_1 or below).

The attitude toward eating (i.e., the importance of eating) as measured with the IEG scale 1 of the Eating Behavior and Weight Problems Inventory turned out to be clearly not associated with volume of mineral water intake. Also, global daily mood and global daily physical comfort are not related to volume of mineral water intake either, although here again type I error rates for the positive correlation coefficients with mineral water intake (p = .09 and .11 for global daily mood and global physical comfort, respectively) and for mean score differences in volume of mineral water intake between groups of respondents scoring low versus high in these dimensions (p = .06 and .11, respectively, with the low groups ingesting less mineral water than the high groups) are low enough to warrant some attention.

Both dimensions were only unassumingly operationalized and were not supposed to yield more than rough estimates of the mood and physical comfort that respondents were experiencing throughout the days of the data collection period (cf.

chap. 2.2), despite the fact that both measures were aggregated over time at the analysis stage. The statistically nonsignificant results may nevertheless provide an indication of the possibility that a more sophisticated way of operationalization of these dimensions involving more than two global scales and clearer hypotheses about causal pathways between moods and nutrition behavior could deliver some substantial results for mineral water intake.

The self-rated SES of a respondent's family of origin, which is supposed to be an indicator of many sources of parental influence and which should therefore partly determine an offspring's food patterns too, as well as a respondent's current personal net income are also not predictive of *volume* of mineral water intake, although earlier research found that both income and social class were related to the *frequency* of soda water consumption in a sample of the Canadian population (Schaninger, 1981).

A respondent's knowledge of the composition of mineral water and of the process of its production and distribution was hypothesized to be associated with mineral water intake. When comparing participants scoring low on the scale (i.e., approximately at the level of the lower quartile Q_1 or below, indicating little or no knowledge) with those scoring high (i.e., approximately at the level of the upper quartile Q_3 or above), a significant mean score difference is found indicating that persons who are knowledgeable about mineral water do really ingest more of it. This relationship does not emerge, however, across the total sample in terms of a significant correlation coefficient, although the respective type I error rate is again comparatively low (p = .11). The inability of the correlation coefficient to break the .05 α level may in this case be attributable to the fact that the items of this ad hoc constructed knowledge test exhibited medium-size to large item difficulties only, which may have made the test differentiate more between persons with a lot of knowledge than with little knowledge (cf. chap. 5.2); this may have attenuated the size of the empirical correlation coefficient with an external criterion.

Dietary restraint, measured as cognitive control of eating behavior by means of FEV scale 1, was hypothesized to be positively correlated with volume of mineral water intake because mineral water is free of calories and ingesting higher volumes of it or substituting it for other, potentially high-calorie beverages may help a person control his or her intake of calories (cf., e.g., Moreira, de Almeida, & Sampaio, 2005; Pudel & Westenhöfer, 2003; see also chap. 2.2). And indeed, a significant difference in volume of mineral water intake is observed between respondents scoring low on this dimension (i.e., persons who tend to enact spontaneous unrestrained eating behavior) compared to those scoring high (i.e., persons who are characterized by a restrained and largely cognitively controlled eating behavior), with the high group ingesting more mineral water. The relevance of the calorie-free character of mineral water for volume of its intake is corroborated by the fact that the corresponding weighted image component (i.e., is free of calories) turned out to be an important predictor of volume of mineral water intake in the framework of the PWM (see below and chap. 5.4). Still, the direct effect of dietary restraint on mineral water intake is too weak to become evident as a significant correlation coefficient across the whole sample, although here again the type I error rate is quite low ($r = .12$, $p = .10$).

In their analysis of consumer survey data by means of SEM, Riepe and Lamprecht (2001) found that FEV scale 1 scores were significantly related to the *images* of different food products, which, in turn, were predictive of the claimed *intensities* of their consumption; yet, FEV scale 1 scores were *not directly* related to consumption intensities (cf. chap. 2.2). It may be speculated, therefore, that a food product's image is a variable that mediates the influence of dietary restraint on volume of its intake.

This hypothesis is supported by the fact that in the present study correlation coefficients between volume of mineral water intake and the sums of both the (optimally scaled) salient *behavioral beliefs about the consequences of mineral water intake* derived within the framework of the TPB and TRA and the (optimally scaled) *weighted image components of mineral water as an object* derived within the PWM do not only become significant (for the sum of behavioral beliefs within the TPB / TRA: $r = .43$, $p = .00$; for the sum of weighted image components within the PWM: $r = .40$, $p = .00$; cf. Table 42), but clearly exceed the coefficient between FEV scale 1 and mineral water intake ($r = .12$, $p = .10$) in magnitude and effect size (cf. Cohen, 1988, pp. 79-80). Moreover, correlation coefficients between FEV scale 1 and the behavioral beliefs or weighted image components, respectively, are also higher than that and significant (for the behavioral beliefs within the TPB / TRA: $r = .22$, $p = .00$; for the weighted image components within the PWM: $r = .24$, $p = .00$).

Thus, the speculation about the role of a food product's image as a mediator between dietary restraint and food intake behavior appears to be justified, as it is consistent with the present data. It is also generally compatible with Ajzen's idea about the relationships between the components of his TPB and behavioral determinants that are external to the model ("background factors", Ajzen, 2005a, p. 134, like traits such as dietary restraint), where a trait is hypothesized to influence behavior via the directly or indirectly measured attitudinal element. The TPB even assumes yet another mediating component, apart from attitude toward the behavior: behavioral intention (cf. chap. 2.3 and 5.4; cf. also Figure 2).

Physical activity is a behavioral domain that may have immediate physiological consequences for a body's water balance because it may lead to an increased loss of body water that needs to be replenished in addition to the 2 to 2.5 L that are lost during resting energy expenditure anyway (cf., e.g., IDM, 2005a; Schek, 2000; cf. also chap. 1.3, 2.2, and 5.2). It was thus hypothesized that the total times individuals spent on average per day on physical exercise and on physical work or labor like occupational activities or activities related to the household or garden, respectively, would increase both mineral water and total beverage intake. Results suggest that physical exercise, but not physical work or labor, does in fact cause an increase in volumes of mineral water and total beverage intake. This is evidenced by both significant correlation coefficients for the whole sample and significant mean score differences between respondents who did not report any physical exercise at all across the 7-day data collection period and those who belonged to the upper quarter of the sample in terms of the time they spent on physical exercise.

Situation-Related Determinants

Although a naturalistic approach was chosen in the present study to ensure ecological validity and representativeness of the behavioral data by taking into account all situational factors that determine a person's real day-to-day beverage intake (cf. chap. 5.1), there were three situation-related potential determinants of mineral water intake selected for being tested separately in this study (see chap. 3, Research Questions 9 to 11): (a) the mutual social influence among the participants and other persons living together with them in their households, if any; (b) the weather; and (c) the relative share of total time participants spent at their homes or out of them, respectively, during the data collection period.

In contrast to findings reported for a sample of Canadian respondents (Levallois, Guévin, Gingras, Lévesque, Weber, & Letarte, 1998), the last factor, the relative time spent at home or out of home, is clearly not related to mineral water intake. But again, the difference in volume of intake between persons who spend comparatively little time at home and individuals who spend a lot of time at their homes, with the latter ones ingesting numerically more mineral water, narrowly fails to break the .05 α level (p = .11). This may indicate that a clearer operationalization of the settings or situations, respectively, where mineral water is ingested and a more differentiated approach to their measurement could yield psychologically meaningful and statistically significant results.

In the present study, the weather (measured at Hamburg Airport) is unambiguously unrelated to volume of mineral water intake and also not related to volume of total beverage intake, although very surprisingly, a low but significant *negative* correlation was found between volume of total beverage intake and minimum, and the sum of minimum and maximum, air temperatures. These findings give rise to two questions: Why do no substantial relationships emerge from the data although it is both common experience and scientific knowledge that weather parameters like warm air temperature can lead to an increased loss of body water and thus to an increased fluid intake (e.g., Bundesverband der Deutschen Erfrischungsgetränke-Industrie, 1998;

Henrichsmeier & Grothe, 1997; Hilbig et al., 2009; IDM, 2003; Stahl & Heseker, 2006; "Trinken im Sommer", 1999; cf. chap. 1.3, 2.2, and 5.3; see also chap. 4.2 and Appendix C, Tables C5 and C6, for results of the qualitative elicitation study, where nearly half of the respondents said that warm weather was a factor facilitating mineral water intake, while cold weather was claimed by 20% of the respondents to be an impeding factor)? And second, why are correlation coefficients found with a sign that is opposite to what could have reasonably been expected?

As to the first question, the interindividual mean of the intraindividually averaged *maximum* air temperature and parameters of its distribution (M = 13.4, SD = 5.0, range from 6.3 to 22.7°C; cf. Table 17), which were identified in this study, may have been too low to exert a significant effect on a body's water balance because reference temperatures reported in the literature, at or above which increased sweat production may cause considerable losses of body water, are much higher than the temperatures recorded in this study (e.g., Henrichsmeier & Grothe, 1997, p. 52: 25°C for North Germany, see also Bundesverband der Deutschen Erfrischungsgetränke-Industrie, 1998; Stahl & Heseker, 2006, p. 354: 29°C; "Trinken im Sommer", 1999, p. 99: >32°C). Also, Petit and Sieffermann (2007) could not establish an influence of moderate outside air temperatures similar to those recorded in the present study (range from 5 to 19°C) on either liking or ingested volumes of iced-coffee. It must be assumed, consequently, that air temperatures below a particular threshold are unrelated to an individual's water balance and to his or her volume of beverage intake, while above the threshold a positive correlation should become empirically verifiable. Yet, this hypothetical threshold does not seem to have been exceeded by the average temperatures that were recorded in the present study.

Regarding the second question, no straightforward explanation can be given for the negative correlation between air temperature and volume of total beverage intake. It was already argued earlier in this text (see chap. 5.3) that the weather measured at Hamburg Airport may be too distal a source of influence to have an immediate impact on beverage intake behavior. This may be particularly true in the winter term for low air temperatures when they are measured outdoors (on the airfield) while most students may be assumed to spend most of their time indoors in heated buildings or vehicles like cars or trains where microclimatic conditions differ substantially from those on the airfield. Put in other words, air temperatures during the cold season are higher indoors than outdoors so that it may have been possible that the correlation between airfield temperature and volume of total beverage intake is (spuriously) negative because cold outdoor temperatures may have resulted in warm indoor temperatures, which students were actually exposed to most of the times. And, as will be remembered, fieldwork for the present study was conducted between January and July, which implies that a substantial share of respondents participated during cold or chilly weather conditions when rooms in buildings are normally heated. Thus, the observed negative correlation may need to be interpreted as an artifact.

Moreover, when outdoor temperatures have risen (beyond the hypothetical threshold, e.g., in the summer term), indoor temperatures (in buildings that are not heated) can be assumed to be more similar to outdoor temperatures, and individuals will spend more time outdoors than during the cold season, both of which will lead to an influence of outdoor weather conditions on the human body that is more straightforward than during the cold season. During warm weather periods, in consequence, weather conditions measured on the airfield may resemble the microclimatic conditions individuals are actually exposed to to a stronger degree and are thus a potentially more proximal source of influence on beverage intake behavior than during cold weather periods. As a result, positive correlation coefficients for respondents whose data collection period covered a period of warm weather may have been attenuated by those who reported their intake in a period of cold weather.

While the pure distance between the point of temperature measurement and the situation where an effect was expected to happen may have spuriously generated significantly negative correlation coefficients for total beverage intake, it may also have contributed to overriding and extinguishing faint, yet potentially measurable influences of the air temperature on mineral water intake resulting in nonsignificant correlation coefficients. This conclusion calls for the use of devices to measure weather parameters directly in the environment a respondent is living in while recording his or her beverage intake.

Even though the subsample of respondents who returned questionnaires from any persons aged 14 or above living together with them in their households turned out to be quite heterogeneous, a clear picture of domestic sources of mutual social influence between both groups of persons emerged (cf. chap. 5.3). This mutual influence is detectable between (a) behavioral belief strength and outcome evaluation, that is the two components that make up the informational foundation (i.e., the behavioral beliefs) of the attitude toward mineral water intake behavior in the TPB; (b) retrospectively measured frequencies of habitual mineral water intake; and (c) between these latter measures and volume of actual mineral water intake reported by the participants during the 7-day data collection period. Quite in accordance with expectations, volumes of mineral water ingested by the respondents are more strongly correlated with their own habitual intake behavior than with the habits of the persons they are living with. These findings emphasize the importance of *social* factors in determining nutrition behavior (cf. chap. 1.1, 2.1, and 2.2).

Models of Food Choice Applied to Mineral Water Intake

While only a few of the isolated potential person- and situation-related determinants of mineral water intake tested in this study (see Research Questions 1 to 11) are found to exert some, although generally low, influence on mineral water intake behavior or on beverage intake behavior in general, both the TPB and the PWM turn out to be adequate models for predicting interindividual variation in volume of mineral water intake (see Research Questions 12 to 15); and both of them are able to explain considerable shares of variance in the target behavior (TPB: 69% in the latent variable; PWM: 26% in the manifest variable). But neither the TRA nor the extended version of the TPB (where the weather, physical exercise, and physical work or labor are added) are superior to the TPB, be it in terms of parsimony (in the case of the TRA) or with reference to the share of explained variance in the target behavior (regarding the extension of the TPB).

In the TPB, the intention to ingest mineral water predicts about two thirds (69%) of the variance in *actual intake*, while perceived behavioral control as a proxy for *actual* control over the behavior is not directly predictive of mineral water intake. This latter finding is in line with results from meta-analyses (e.g., Armitage & Conner, 2001a; Cheung & Chan, 2000; Godin & Kok, 1996), where it was concluded that perceived behavioral control, on average, adds only little, if anything, to the prediction of *behavior*. The direct measures of attitude toward mineral water intake and perceived behavioral control together predict 62% of the variance in the *intention* to ingest mineral water, with the attitudinal element being the stronger predictor compared to perceived behavioral control.

Subjective norm, however, does not contribute to the prediction of the intention to ingest mineral water. The absence of an influence of subjective norm on behavioral intention is not surprising as it had been already foreshadowed when, in the qualitative elicitation study, the majority of respondents was unable to mention any potential referent, neither an approving nor a disapproving one (cf. chap. 4.2). Thus, mineral water intake appears to be a behavior that is independent of perceived social pressure to perform or not to perform it. Similar findings were reported for applications of the TPB to health-related behaviors (e.g., Godin & Kok, 1996; see also Armitage & Conner, 2001a; Ogden, 2003) or to behaviors performed on a daily or weekly basis, like mineral water intake, as opposed to those performed annually or biannually (Ouellette & Wood, 1998), or of the TRA to food-related behaviors (e.g., Axelson & Brinberg, 1989, p. 113; Shepherd, 1990); other authors even refrained from including subjective norm as a potential predictor in the TRA due to its presumed low importance to food intake (e.g., Di Natale & Saba, 1997). Recently, however, some authors were able to establish an influence of subjective norm (a) on the intention to ingest fruits and vegetables (Blanchard et al., 2009; Pawlak & Malinauskas, 2008), (b) on intended intake of alcoholic beverages (Huchting, Lac, & LaBrie, 2008), and (c) on the intention to consume fish (Tuu, Olsen, Thao, & Kim Anh, 2008). It may be speculated as to whether mineral water is a low-involvement product (cf., e.g., Caprara, Barbaranelli, & Guido, 1998), which causes its intake to be a behavior that is far too commonplace and irrelevant to most individuals to be ruled essentially by perceived normative prescriptions.

Two major *behavioral* beliefs (referring to the aspects of fostering one's health and one's well-being), together with two less important ones, explain 56% of the variance in the direct measure of the attitude toward mineral water intake; and two *control* beliefs (referring to the aspect of availability of mineral water in a person's habitat) explain 27% of the variance in the direct measure of perceived behavioral control.

Reliabilities or temporal stabilities of the manifest variables used for testing the TPB by means of SEM range from .76 to .93, which can be considered as good to very good (e.g., Backhaus, Erichson, Plinke, & Weiber, 2006, p. 378; Francis et al., 2004, p. 30; Heidenreich, 1987, p. 433; Homburg & Baumgartner, 1998, p. 361; Oppenheim, 1992, p. 200); yet the overall fit of the path model is only acceptable but not good, although there are no indications of severe misspecifications (cf. chap. 5.4).

It is difficult to define an unambiguous benchmark against which to hold the TPB-related results in order to put them into context. Sutton (1998) discusses several potential standards of comparison for the TPB or TRA like, for example, variance explained by the model in relation to the ideal maximum of 100%, practical utility, or "the percentage of variance in intention and behavior explained by other theoretical models" (p. 1321). According to this latter option, both the TPB and the PWM perform fairly well compared to what the isolated person- and situation-related determinants are able to achieve (see above), with the exception of the magnitude of correlation coefficients between retrospectively measured habitual behavior of the respondents and their own actual intake behavior recorded during the data collection period (*r*s ranging from .61 to .68), but this is not very impressing from a theoretical point of view.

Although a host of publications is available reporting results of applications of the TPB and the TRA to nutrition behavior and in spite of the existence of a considerable number of corresponding meta-analyses that integrate findings across a wide range of behaviors (see chap. 2.3), any comparison of the present results in terms of model fit and explanatory power of model components with published results reported for the TPB (or the TRA) is hampered by the fact that these results and findings vary substantially for a variety of reasons, for example: (a) Studies target different behaviors, which the predictors in the model may influence to systematically different degrees, even within the nutrition-behavior domain; (b) studies have different target populations and thus have different sample compositions; (c) many of the findings are based on applications of the TRA (i.e., without including perceived behavioral control) or on applications of the TPB where components other than perceived behavioral control were left out (e.g., Sparks & Shepherd, 1992; or Yaman, 2003, who did not model real behavior as a consequence of behavioral intention), or where additional predictors that were not initially suggested by Ajzen or Fishbein were added (like habit, past behavior, or SES; e.g., Conner, Warren, Close, & Sparks, 1999; Norman & Conner, 2006; Rosin, Tuorila, & Uutela, 1992; Saba & Di Natale, 1999), or where alternative causal relationships were suggested (e.g., Hansen, Jensen, & Solgaard, 2004, hypothesized a causal influence of subjective norm on attitude toward the behavior); in fact, there do not appear to be very many reports available of applications of either model in the way they were originally intended to be used by Fishbein and Ajzen (e.g., Sheppard, Hartwick, & Warshaw, 1988, p. 336); and (d) it seems that in the vast majority of studies the models were tested by means of correlation or regression analyses that were applied to *manifest* variables (e.g., Armitage & Conner, 2001a), while SEM was used only in a minority of studies (Cox & Anderson, 2004, p. 160) for modeling relationships between *latent* variables; and even here models differ in terms of estimation procedures, standardization of variables, correlation of exogenous latent variables, construction and level of aggregation of indicators, and so forth (see chap. 2.3).

The following comparisons draw on some nutrition-related applications of the TPB or TRA by means of SEM, where the model components were treated and interrelated as closely as possible to their original conceptions (cf., e.g., Ajzen, 1991, 2002a, 2005a; Ajzen & Fishbein, 1980); fit indices for the application of the TPB to the *present* data by the use of SEM are repeated here: RMSEA = .11, RMS = .02, GFI

= .92, AGFI = .85, AIC = 0.51, NFI = .95, NNFI = .95, and CFI = .97 (see also chap. 5.4 and Figure 6).

Collins and Carey (2007), for instance, used the TPB to model heavy episodic drinking among students; they found that attitude and perceived behavioral control (with a *negative* sign), but not subjective norm, predicted 45% of the variance in behavioral intention, which, in turn, accounted for 21% of behavioral variance. Their model fit was better than in the present study (RMSEA = .03, CFI = .99) and so tended to be the fit determined by Huchting, Lac, and LaBrie (2008) when modeling alcohol consumption among female students (RMSEA = .06, NNFI = .96, and CFI = .97). These latter authors managed to explain the same share of variance (45%) in behavioral intention and nearly three quarters (73%) in behavior. When explaining fish consumption in a sample of Vietnamese consumers, other researchers (Tuu, Olsen, Thao, & Kim Anh, 2008) found similar fit indices (RMSEA = .05, GFI = .95, and CFI = .97), although their shares of explained variance were lower (for intention 31%, for frequency of behavior 13%). Caprara, Barbaranelli, and Guido (1998) modeled predictors of the intention to buy pasta products and found that both attitude and subjective norm, but not perceived behavioral control, predicted about two thirds of the variance in buying intention; NFI, NNFI, and CFI indicated excellent model fit (ranging from .97 to 1.00). In this case, the TPB was reduced to an application of the TRA. Quite similarly, other authors (O'Callaghan, Chant, Callan, & Baglioni, 1997) failed to use the TPB to predict intake of alcoholic beverages in Australian students, because the influence of perceived behavioral control did not become significant. The TRA, instead, was able to explain 25% in behavioral intention, and intention predicted 40% in behavioral variance (RMSEA = .08, RMS = .05, CFI = .97).

In an attempt to predict grocery buying intention from two online surveys among Danish and Swedish consumers by means of the TPB, Hansen, Jensen, and Solgaard (2004) found that GFI was .94 in both surveys, while RMSEA ranged from .09 to .11 and both NFI and CFI from .96 to .97. They managed to explain 56% and 62%, respectively, of the variation in online buying intention. Using habit as an additional predictor while excluding subjective norm, Di Natale and Saba (1997) applied the TRA to cheese consumption in a sample of the general population in Italy. They were able to explain 65% of the variance in behavioral intention, which the authors claim to be an "excellent" share ("l'intenzione è ottimamente spiegata", p. 483), but only 10% in behavioral variance; reported fit indices were: RMS = .09 and AGFI = .91.

Anderson, Winett, and Wojcik (2000) used a different theoretical approach (i.e., another social-cognitive model of nutrition behavior that encompassed SES variables too) to modeling global nutrition behavior of U.S. supermarket food shoppers by means of SEM. Their model accounted for 56% of the variance observed in nutrition behavior (RMSEA = .06, GFI = .92, and AGFI = .88).

This short review of studies clarifies several issues: Results from the application of the TPB to the data of this study can keep up very well with published results from similar research into nutrition behavior. The ability of the model to account for the variance in the *intention* to ingest mineral water (62% explained) is well in line with comparable figures reported above, while for volume of mineral water intake it is able to explain a very high share of *behavioral* variance (69%) which was hardly achieved by any of the aforementioned studies. This latter share is particularly impressing when keeping in mind that the average proportion of explained behavioral variance found in TPB and TRA applications to *health* behavior is estimated to range from only 27% to 31% for *prospective* studies like the present one (Rutter & Quine, 2002b, p. 13). Respective figures for the prediction of behavioral intention suggest a share of about 40% (p. 13; see also chap. 2.3).

The significance of the high share of explained behavioral variance found in the present study is even accentuated by the fact that there should be little common method variance present in the relationship between behavioral intention and behavior, because data of the latter are based on self-reported estimates of intake recorded concurrently in natural environments while the stream of behavior unfolded over time (cf. Sutton, 1998, p. 1328). Unlike an ostensibly large share of TPB studies conducted in the field of nutrition behavior, this study does not make use of behavioral data that were obtained by administering a questionnaire (some researchers did not even ascertain behavioral data at all; see, e.g., Caprara, Barbaranelli, & Guido, 1998; Hansen, Jensen, & Solgaard, 2004), but by using a beverage diary. Similar data collection methods were employed by, for instance, Anderson, Winett, and Wojcik (2000) or Di Natale and Saba (1997). Behavioral intention, by contrast, was assessed in a laboratory-like situation by means of a questionnaire. (For critical comments related to this particular point see chapters 6.2 and 6.3. below)

The strength and statistical significance of the *predictors* of behavioral intention (i.e., attitude toward the behavior, subjective norm, perceived behavioral control) found in this study are quite concordant not only with findings from meta-analyses (see above and chap. 2.3) but also with those from the above mentioned studies. However, the indices of model fit reported there tend to be slightly better than those found in the present study, though the latter are still within an acceptable range (cf. chap. 5.4).

It should be noted that the results obtained from the analyses of the mutual social interdependencies between the respondents and any persons living together with them in their households (see above and chap. 5.3) have implications for the TPB-related findings. These results, which reflect domestic sources of social influence on mineral water intake, do not only make it clear that (retrospectively measured) habitual mineral water intake of both groups of individuals is interrelated and that actual, prospectively reported mineral water intake is predictable from an individual's *own* habit and also from the habitual behavior *of the persons he or she is living with*, but more importantly, the results demonstrate mutual social determination of the components that the behavioral beliefs related to mineral water intake consist of (i.e., behavioral belief strength and outcome evaluation). In other words, data from the present study demonstrate how items of the informational foundation, which the indirect, belief-based antecedents of the attitude toward the behavior are made up of, are embedded in a social context consisting, at the very least, of the participants themselves and the persons with whom they are living together in the same household; they demonstrate that both groups of persons have common behavioral beliefs.

Within the framework of the PWM, three weighted image components (referring to the calorie-free character of mineral water and to the aspects of fostering one's health and one's well-being) turned out to be significant predictors of mineral water intake explaining 26% of its variance. This share of variance is within the upper range of the multiple correlations Pudel and Westenhöfer (2003) reported on the only application of their model to food choice data that seems to have been published to date. The similarity of two of the weighted image components to the behavioral beliefs that predict the direct measure of the attitude toward the behavior in the TPB is at least partly rooted in an overlap between the information both models are built on (see chap. 2.3 and 5.4).

As was explicated earlier in this section, the correlation coefficient between volume of mineral water intake and the sum of the weighted image components of mineral water within the PWM is significant and high (r = .40), while the correlation coefficient between FEV scale 1 and the sum of the weighted image components is also significant and relatively high (r = .24). Given the fact that the calorie-free character of mineral water is the strongest of the single image components that predict mineral water intake in the PWM, the speculation made above that the image of mineral water may mediate the impact of dietary restraint on volume of its intake is substantiated even further.

Final Conclusion: Explaining Mineral Water Intake in Students

According to the theory of planned behavior (TPB), students tend to ingest high volumes of mineral water if they have a strong intention to ingest it; that is, if they are motivated to do so. The strength of their intention depends on (a) the degree to which they hold a favorable attitude toward ingesting mineral water, that is, the more positively they evaluate ingesting mineral water (i.e., attitude toward the behavior, a strong predictor); and (b) the strength of the confidence they have in the capability of performing mineral water intake behavior, that is, the extent to which they believe that they have the means and opportunities to enact the behavior (i.e., perceived behavioral control, a less important predictor). The attitude toward the behavior is determined by the behavioral beliefs that mineral water intake fosters students' health and well-being; perceived behavioral control is dependent on the control beliefs students have regarding the availability of mineral water in their natural environments including their households.

Behavioral beliefs are embedded in a social context: Students and the persons they are living with in their households partly share the informational basis behavioral beliefs consist of. Also, habitual mineral water intake of both groups and actual mineral water intake of the students are mutually interrelated at the behavioral level.

According to Pudel and Westenhöfer's model of cognitive decision making on foods (PWM; Pudel & Westenhöfer, 2003), there are three weighted image components related to mineral water that determine the volume of its intake: being free of calories and fostering students' health and well-being.

The direct influence of dietary restraint as a single person-related determinant on volume of mineral water intake is only very weak. It is, however, substantially correlated with the totality of both the behavioral beliefs in the TPB and the weighted image components in the PWM. This finding corroborates the speculation that there may be a substantive influence of dietary restraint on mineral water intake but that this influence may be mediated at least by the beliefs underlying mineral water intake.

Results also suggest that the time spent on physical exercise is another isolated person-related determinant that causes a slight increase in volume of mineral water intake; this outcome, however, could not be replicated within the framework of the TPB (see chap. 5.4 and Figure 10).

Thus, the findings derived from the present study supply clear indications of the factors that make some students tend to drink more and others less volume of mineral water and of the relative strength of their impact. Interrelating these factors in theoretically meaningful ways helps to explain and understand mineral water intake behavior; using them as predictors in appropriate statistical models (e.g., regression analysis or SEM) would allow for the prediction of ingested volumes (cf. Sutton, 1998, pp. 1318-1319, for a discussion of the distinction between prediction and explanation).

6.2 Comments on the TPB Results

While several limitations of the TPB were already discussed in chapter 2.3 (i.e., the adequacy of the way in which beliefs are supposed to be mentally processed, the inability to ascertain actual control of the behavior, the disregard of potentially important variables that are not considered in the model, the neglect of giving attention to affective influences on food choice), the causal interpretation of the present results in general and of the correlative relationship between the intention to ingest mineral water and its actual intake, in particular, strongly rests on the adequacy of the TPB as a model for day-to-day mineral water intake and on the validity of the measures ascertained by means of the questionnaire.

Despite the qualitative elicitation study (see chap. 4), which made sure that the quantitative main study comprised the salient beliefs of the target population, and despite the preparation of the questionnaire for the quantitative main study according to the prescriptions given by Ajzen (Ajzen, 2002a; see also Francis et al., 2004), the present instrument was constructed on an ad hoc basis, and its questions and items were not validated prior to its application. In consequence, doubts may be raised as to the claimed causal interpretation of the correlation between behavioral intention as the supposedly most proximal determinant of mineral water intake and actual mineral water intake that was reported during the data collection period. Because the TPB is only a *model* of behavior, its components may certainly serve as *predictors* of the behavior in question, but they need not necessarily reflect its *causal* determinants.

In the most basic terms, a significant correlation coefficient between two measures may only be interpreted as a coincidence of two phenomena that indicates the possible existence of a causal relationship; it is a necessary but not a sufficient condition for establishing causality and, thus, is no evidence for it (e.g., Bortz, 1989, p. 288). In order to determine causality, it is indispensable, according to philosopher David Hume, that the cause temporally precedes the effect (e.g., Försterling, 2001). In line with this reasoning, it is not implausible to assume a direct causal influence of the intention to ingest mineral water on actual behavior that was reported during the data collection period, since the former had been ascertained *before* the latter was performed. But vice versa, it does not make sense to hypothesize a direct causal relationship between both characteristics in the opposite direction, as that would imply a causal effect of future behavior on the currently expressed intention to perform it.

However, it may well be the case that both measures are directly or indirectly influenced by one or more other variables that were not incorporated into the model (cf., e.g., Backhaus, Erichson, Plinke, & Weiber, 2006, pp. 346-347; Bortz, 1989, p. 288). Given the fact that the target behavior of the present study was aggregated over a 7-day period, which was done in order to capture an individual's *habitual* intake behavior and thus to ensure ecological validity and representativeness of the behavioral data (see chap. 5.1), one of the most obvious factors that must be suspected to have influenced reported mineral water intake during the data collection period is a person's *past* intake behavior: "Past behavior ... is the best predictor of future behavior. Human beings are said to be creatures of habit; they tend to persist in doing what they have become accustomed to" (Ajzen, 2002c, p. 107). The frequency with which a behavior was performed in the past is often taken as an indicator of habit strength, provided that the behavior "could be performed on a daily or weekly basis in a stable, predictable supporting context" (Ouellette & Wood, 1998, p. 65), as in the case of, for instance, beverage consumption.

And in fact, empirical findings reported in the literature demonstrate the ability of past behavior (a) to contribute directly to the prediction of future behavior independent of the influence exerted by the TPB components; (b) to influence TPB components such as behavioral intention, which, thus, *mediate* the influence of past behavior on future behavior; and (c) to *moderate* the relationship between intention and actual behavior such that a weaker relationship is likely to be found with increasing habit strength (e.g., Conner, Warren, Close, & Sparks, 1999; de Bruijn, Kroeze, Oenema, & Brug, 2008; Furnham & Lovett, 2001; Kvaavik, Lien, Tell, & Klepp, 2005; Norman & Conner, 2006; Ouellette & Wood, 1998; Rosin, Tuorila, & Uutela, 1992; Saba & Di Natale, 1999; Saba, Moneta, Nardo, & Sinesio, 1998; Verbeke & Vackier, 2005).

Ouellette and Wood (1998) maintain that habits "are tendencies to repeat responses given a stable supporting context" (p. 55), which translates into stimulus-cued reactions. For such reactions, past behavior can be modeled as a direct source of influence on future behavior "primarily when people have had ample opportunity to perform the behavior in stable contexts" (p. 58), while for low-opportunity behaviors and for behaviors performed in unstable contexts, they posit "an indirect relation between past and future behavior, which is mediated by conscious intentions" (p. 58). Ajzen (2002c) holds, though, that, from a practical perspective, adding past behavior frequency to the TPB may help to increase explained variance in future behavior, but in so doing little is gained theoretically because the correlation between past and future behavior "merely provides a measure of the behavior's temporal stability" (p. 120).

According to the TPB, "past events are important only to the extent that they have left an enduring mark on the person, a mark that continues to wield its impact .... Attitudes ... are meant to capture these residues of past experience" (Ajzen, 2005a, p. 142). The TPB assumes that for novel behaviors intentions are formed deliberately, but "after repeated opportunities for performance, deliberation is no longer required because the intention is activated spontaneously in a behavior-relevant situation" (Ajzen, 2002c, p. 118). Thus, when a particular behavior such as mineral water intake is performed repeatedly over time, it will become a habit, although it is not assumed to come under the control of external or internal stimulus cues, which then might automatically activate the behavior without further cognitive intervention.

Although many individuals clearly have an intention *to buy* mineral water, which becomes obvious when they put it on a list to guide their shopping expedition through a supermarket's jungle of stimulus cues, the adequacy of the TPB to model mineral water *intake* behavior over several days may be questioned. The point here is that the total volume of mineral water intake is a measure that is aggregated across time and, very likely, across different situations of intake; in each of these situations, however, intake behavior may have been controlled by different factors. While the TPB may be an adequate approach to the prediction and explanation of intake behavior performed in some of them, in others it may not.

For example, a person who regularly takes physical exercise may have a favorable attitude toward ingesting mineral water and, in consequence, may form an intention to drink mineral water after an exercise session is over because he or she holds the beliefs that drinking mineral water will foster his or her health and well-being; for this type of situation, behavioral beliefs and attitude toward the behavior may be causal antecedents of behavioral intention. In another situation, however, the same person may drink mineral water with his or her lunch merely because, in that particular situation, the set of beverages on offer leaves mineral water as the only acceptable option to choose. In this latter context, the availability or unavailability, respectively, of alternative beverages may have comparatively high explanatory power. Furthermore, subjective norm might have become an important predictor of behavioral intention in the present study had the focus of the items measuring the constructs of the TPB been restricted to mineral water intake on Saturday night parties with their potentially high social pressure to prefer alcoholic to nonalcoholic beverages.

Thus, when respondents were asked in the premeasurement session to estimate their intended volume of mineral water intake, to assess their attitude toward it, their perceived behavioral control over it, and so forth, they may not have anticipated all factors being actually relevant to their intake behavior in the forthcoming 7 days. Put in other words, respondents may have been urged in the premeasurement session to assess an intention that they never would have had had they not been asked to ascertain it (see chap. 2.3; cf. Pudel, 2001).

But still, if the study's focus had been a particular type of situation, such as replenishing body water after physical exercise, the appropriateness of the TPB with its causal assumptions may be questionable. Instead of referring to relatively abstract attributes ascribed to the consequences of mineral water intake, an individual's attitude toward ingesting mineral water may as well be a function of his or her recollections of earlier occasions on which that person ingested mineral water after having taken exercise (Eagly & Chaiken, 1993, p. 105). These recollections may have become part of a *script* of an exercise session, where script denotes "a stored representation of the events likely to occur and the relationships between them in a particular situation, such as having a meal at a restaurant. It is needed to understand any reference to that situation and also to plan what to do in it" (Sutherland, 1995, p. 413). A script for an exercise session might then encompass the ingestion of mineral water with its perceived effects on mood and physical comfort. Based on this script, a person might respond accordingly to items administered in the premeasurement session about whether or not drinking mineral water fosters his or her health and well-being; but the beliefs reflected in these items need not be the real causal determinants of the attitude toward mineral water intake.

Viewed from the standpoint of *self-perception theory*, however, many internal stimuli such as moderate hypovolemic thirst and the experience of quenching it with mineral water are too weak and ambiguous to facilitate attitude formation. Instead, "people infer their own attitudes ... partly by observing their overt behaviour and the circumstances in which that behaviour occurs. A canonical example is of a man who is asked whether he likes brown bread and who replies, 'I must like it: I'm always eating it.'" (Colman, 2003, p. 661). Likewise, respondents in the present study may have inferred a favorable attitude toward mineral water intake simply by considering the frequency with which they had ingested mineral water in the past, and their intention to ingest mineral water in the forthcoming 7 days may then have been derived from these attitudes. Such inferences are most likely drawn from intrinsically motivated behaviors, that is, from behaviors that individuals experience themselves as having freely chosen, as in the case of mineral water intake after having taken physical exercise (Ouellette & Wood, 1998; Smith & Mackie, 2007). Similar to the implications of script theory (see above), causal relationships between beliefs, attitude, behavioral intention, and actual behavior as suggested by self-perception theory differ from those claimed by the TPB. Most importantly, self-perception theory suggests that a favorable attitude toward the behavior is not so much based on behavioral beliefs about the consequences of that behavior, but by observing one's own behavior; individuals then project their past behavior into the future. Here, attitudes and beliefs serve as a means of retrospectively making sense of one's own behavior, not as its causal antecedents. The way in which individuals assign causes for their own, and other persons', behavior is elaborated in attribution and attributional theories (see, e.g., Fincham & Hewstone, 2001; Försterling, 2001).

In whichever way past nutrition behavior may influence concurrent or future behavior, habitual mineral water intake has been shaped throughout the entire process of an individual's socialization. General principles of the acquisition of nutrition behavior, which may have had an impact during respondents' socialization, and potential determinants of mineral water intake have been outlined in chapter 2. Individuals differ in their habitual and concurrent nutrition behavior because they have experienced these habit-forming forces differently in the past, both qualitatively and quantitatively. Conceptually, both script and self-perception theories appear to be related to the mere exposure effect, which describes the observation that the repeated exposure to a stimulus, such as a food item, enhances its likability for a person or the attitude of that person towards it. Thus, when, during socialization, individuals are taught which foods are accepted within their society, they start to like the foods they eat and to develop favorable attitudes to them merely because they eat them, but they do not so much select their foods because they like them. As the shaping of their flavor preferences starts presumably during their prenatal periods, all human beings have a long history of eating and feeding experience behind them before they become capable of making their own nutrition behavior an object of their reasoning (see chap. 2.1).

6.3 Comments on the Methodology

When the present study was planned and carried out, great care was taken to try and make sure that it delivers high-quality data and permits unambiguous interpretation of findings. Some of the factors that are considered to have contributed to the achievement of important aspects of this goal (see chap. 5.2 for a discussion) are, for example: (a) identifying and selecting theoretically meaningful determinants of the target behavior from a wide range of potential sources of influence, (b) conducting an elicitation study to derive salient beliefs for use in the TPB, (c) choosing a naturalistic approach to data collection in order to ensure ecological validity and representativeness of the behavioral data, (d) employing a prospective study design where the main predictor variables were measured before the target behavior was performed, (e) training the respondents and supplying them with a measuring cup to increase the reliability of reported volumes of beverage intake, (f) monitoring and recording the stream of real behavior in natural habitats as it unfolded over time, (g) achieving a sufficient sample size, and (h) adhering to the principles of aggregation and compatibility and of optimal scaling of factors in multiplicative composites (cf. chap. 2.2, 2.3, and 5.1). Moreover, models of food choice that were used in this study (i.e., TPB, TRA, PWM) were applied as closely as possible to the prescriptions given by their originators (Ajzen, 1991, 2002a, 2005a; Pudel & Westenhöfer, 2003; see also Francis et al., 2004).

In consequence, the total volumes of ingested beverages including mineral water, after they had been aggregated intra- and interindividually across the present sample (see chap. 5.2 and Table 5), appear to be consistent with data from other sources. Although little is known about beverage consumption habits among students (see chap. 2.2 and Figure 1; cf. also chap. 1.3), a comparison of total volumes estimated for the present sample with available consumption figures from the German population does not suggest a severe discrepancy between both with regard to water intake: Potable water, in general, and mineral water, in particular, have the biggest shares of total volume of beverages ingested in the present sample followed by coffee, a result which is quite in line with findings for the general population (e.g., Axel Springer AG - Mediapilot, 2005; Hilbig et al., 2009; Mensink, Beitz, Burger, & Bisson, 2000).

Despite any good news about the data quality of the dependent measures used in this study, it should be kept in mind that, in order to avoid reactivity effects, respondents were not given legal definitions of what exactly constitutes mineral water as opposed to other water formats. Instead, participants were left alone with their own notions of these categories and were instructed in such a way as to make them record ingested volumes of what they *believed* was mineral water, regardless of whether their concept of mineral water was concordant with the legal definition of the beverage they recorded (cf. chap. 5.1). This procedure may have reduced the *nutrition-scientific* validity of reported mineral water intake in this study, but this is not relevant to its objective, which is a *psychological* one. As was explicated in chapter 5.1 (see also chap. 1.3 and 2.2), the study's aim was not to investigate the supply of a particular fluid or nutrient, its aim was to investigate *drinking behavior*. As individuals do not ingest volumes of fluids or amounts of nutrients or legal definitions of food, but eat foods and drink beverages that they classify according to their own, idiosyncratic system of categories, these latter are the ones that need to be addressed when, eventually, results of the study are intended to be used to initiate behavioral changes in humans.

Apart from any limitations of the validity of the study's dependent variables, there are other issues that may limit the scope of the present findings and may impede their generalizability. One major drawback is the sample composition. Results of the present study may be generalized to university students in Germany at best, a clear disadvantage compared to Wüstefeld-Würfel's (1999) nationwide representative survey; and even for students a random sample would have been the better choice. However, any representative sampling procedure would have gone far beyond the budget that was available for this study.

In addition to the lack of representativeness of the sample of participants, the question may be raised as to whether the effect of potential moderator variables (like, e.g., type or size of household, sex, or the extent of nutrition knowledge; cf., e.g., Conner & Armitage, 2002, p. 31; Grogan, Bell, & Conner, 1997; Moreira, de Almeida, & Sampaio, 2005) should have been investigated too or whether the sample should have been narrowed down to respondents of just one of the categories of a potential moderator variable, thus making it more homogeneous. The first option may have resulted in a reduction of the effective sample size (e.g., to the number of women in the sample), and the second option would have made it more difficult to find enough participants to achieve a sample size comparable to the present one (i.e., $N = 179$) and therefore may have implied to extend fieldwork time even further; both alternatives were not considered to be better choices.

Also, selection and operationalization of the independent variables used in this study offer some potential for optimization. As for the *person-related determinants*, there is only little, if anything, that can or should be improved with regard to the previously published instruments that were used in this study. Results suggest that the VARSEEK-scale, FNS, and IEG scale 1 may well be deleted from the list of potential predictors of mineral water intake. Dietary restraint measured with FEV scale 1, however, bears some potential for predicting beliefs related to the consequences of mineral water intake or image components of mineral water as a food product, respectively, which, in turn, may be predictive of its intake. This relationship could be worthwhile investigating in more detail. Results also suggest that mood and physical comfort might have turned out to be substantially related to mineral water intake if they had been more adequately operationalized in the present study. The same holds for SES which must still be expected to have some explanatory potential if measured more precisely.

The ad hoc constructed test of knowledge related to mineral water that was used in this study might serve as a predictor of mineral water intake better if it also included low-difficulty items; a well-constructed test of general nutrition knowledge might serve this purpose even better. With respect to physical activities, the use of technical appliances for their objective measurement (like, e.g., an accelerometer; cf. chap. 2.2) might prove valuable for increasing their power to predict beverage intake. Objective methods would not only allow for ascertaining actual energy expenditure instead of the mere duration of a particular activity, but they would also help to overcome ambiguities in the data that could arise from difficulties respondents may have had classifying an activity as either exercise or labor (as in the case of, e.g., walking or bicycling; see chap. 5.1).

Regarding the *situation-related determinants* of mineral water intake, a technical device would also be useful for recording weather information that reflects the microclimatic conditions a respondent is actually exposed to during the data collection period. Such an apparatus could be integrated into an accelerometer, for instance, to facilitate the manageability of the recording procedure. Also, staying at one's home or out of it may be a distinction between settings that is much too rough to yield meaningful results; a further differentiation particularly of the out-of-home settings could be more promising. For example, these settings could be separated into those where a respondent stays at the private home of somebody else (e.g., a member of his or her family) and other settings where he or she is in public places. Settings could also integrate centrally performed behaviors that may precede mineral water intake or that may be accompanied by its intake (cf. Wüstefeld-Würfel, 1999), assuming that mineral water intake itself will hardly ever be a centrally performed behavior in any setting. In this case, settings would turn into *situations* as defined by Buse and Pawlik (1996; Pawlik & Buse, 1996; cf. chap. 2.2). Ultimately, this calls for the development of a general classification system for settings or situations that could be used in research into the context of food intake, but psychology is far away from having any such system available (cf. chap. 2.2). The times respondents stayed at their homes could also be combined with further research into the mutual social influence on food-related behaviors between them and the persons they are living with.

Person-related determinants of food choice other than dietary restraint (e.g., SES) could be tried for predicting the belief-based measures in *models of food choice* like the TPB or PWM. It may also be the case that the definition of a situation that was used within the PWM (i.e., the totality of the habitat respondents were living in during the 7-day data collection period) was too broad to achieve a bigger share of explained variance; a more narrowly defined situation might help to explain more of it (see Pudel & Westenhöfer, 2003, p. 317).

It was argued above (see chap. 6.1) that there should be little common method variance present in the relationship between behavioral intention and behavior as postulated by the TPB, in fact between nearly all predictors and the target behavior, because mineral water intake was not assessed by means of the same questionnaire administered in the same session where most of the predictor variables were measured, but was prospectively measured by means of a beverage diary. Yet there is one potentially important problem associated with such a research design, which may lead to a spuriously increased share of explainable variance too. The point is, if a person is asked for nearly an hour about his or her habitual mineral water consumption and, more importantly, about his or her mineral water intake in the forthcoming week, a mental set is likely to be evoked that may predispose the individual to act differently towards mineral water as an object or in relation to its intake during the data collection period than he or she would have done had they not participated in the premeasurement session, regardless of the data collection method used. In particular, the person may become more likely to perform the behavior or may be inclined to do it more frequently: "If individuals are asked for their intention to use a product, for instance, the frequency of its usage will be increased just by asking that question. Thus, the request that was originally meant to be a measurement, turns into an intervention" ("Wenn man zum Beispiel nach der Absicht fragt, ein Produkt zu verwenden, steigert man genau mit dieser Frage die Verwendungshäufigkeit. Die Nachfrage, die doch eigentlich eine Messung sein sollte, wird so zur Intervention.", Felser, 2007, p. 20). Unfortunately, there is no way to estimate the effect of this potential bias in the context of the present study.

6.4 Options for Changing Mineral Water Intake

Though the legitimation of the present study was derived partly from its *potential* to develop an intervention program that aims at changing mineral water intake behavior (see chap. 3), an *elaboration* of this potential was clearly not the study's objective; rather it had to focus on the prediction and explanation of intake. In spite of that, a very brief outline of how findings from the present study could be used to plan and carry out interventions aimed at increasing volume of mineral water intake will be given in this section.

On the face of it, it does not appear to be necessary at all to try and increase mineral water intake in students in Germany or in the whole population, as volume of its consumption already ranks highest on the list of ingested beverages (see discussion in chap. 6.3 and also chap. 1.3, 2.2, 5.2 and Table 5; see also Axel Springer AG - Mediapilot, 2005; Hilbig et al., 2009; Mensink, Beitz, Burger, & Bisson, 2000, pp.

330-331). However, it was also reported in this text that alcoholic, caffeinic, and sweetened beverages (with coffee, beer, cola beverages, and sodas being the most relevant of them) contribute considerable shares to the total volume of beverage intake both in the general population and among the students in the present sample (see chap. 1.3 and 5.2 and Table 5); but none of these types of beverages belongs to the list of preferable beverages that are recommended to be used for replenishing losses of body water (instead, potable water, unsugared herbal teas, or mixtures of water and fruit juice should be used; see, e.g., DGE, 2002; Hagen & Schmahl, 1996; IDM, 2003; Stahl & Heseker, 2006; "Trinken im Sommer", 1999). According to some sources, individuals in Germany are also suspected of being affected by mild though chronic dehydration due to insufficient fluid consumption (e.g., Wentz, Boeing, Remer, & Manz, 2004; see also Pfau & Piekarski, 2000; but cf., e.g., Hilbig et al., 2009; Lührmann et al. 2001; Mensink, Beitz, Burger, & Bisson, 2000); any person who is affected by chronic dehydration might benefit from an intervention that increases mineral water intake. And from a mineral water manufacturer's point of view, an increase in sales volume should be welcome anyway. Overall, there are several motives for increasing mineral water intake at the population or at the individual level.

Thus, given the present findings, nutritionists, nutrition consultants, or public health specialists, on the one hand, and marketing experts, on the other, might want to get some hints as to how mineral water intake can be increased by means of targeted or tailored interventions, respectively. Targeted interventions are designed to address a defined subpopulation while tailored interventions are meant to address a specific person (Conner & Armitage, 2002, pp. 64-67). With regard to targeting an intervention, the disadvantage of the composition of the present sample discussed above now changes into a benefit: The likelihood of an intervention to be successful is greater when the target group is narrowly defined, as, for example, in the case of university students in Germany (cf., e.g., Bruhn, 2008).

Both models of food choice that turned out to be adequate models for predicting interindividual variation in volume of mineral water intake, that is, the TPB and the PWM, offer clear starting points for dietary interventions. According to the TPB, an intervention can be directed at one or more of the predictors of behavioral intention (i.e., attitude toward the behavior, subjective norm, perceived behavioral control), provided they turned out empirically to have a significant impact. An intervention must then try to change the informational foundations of these predictors, that is, the *salient* beliefs that underlie them: "The purpose of an intervention would be to change those ... beliefs in an attempt to move the person up or down the outcome continuum" (Rutter & Quine, 2002b, p. 16). There are basically two ways to attain this goal: creating new salient beliefs, which may include making nonsalient beliefs salient, or changing existing salient beliefs (Ajzen, 2005a, 2008; Armitage & Conner, 2002; Conner & Armitage, 2002; Margetts, 2004; Sutton, 2002). The present findings offer the opportunity to pursue the latter option.

It was found that attitude toward the behavior is the strongest predictor of the intention to ingest mineral water, followed by perceived behavioral control, while subjective norm did not exert a significant influence on it (see chap. 5.4 and Figure 6, and chap. 6.1). It can thus be concluded that increasing the direct measure of the attitudinal element will lead to an increase in behavioral intention which, in turn, will lead to an increase in intake, and that this operation should have a stronger positive impact on intention than increasing the direct measure of perceived behavioral control, although that would still be more promising than changing the subjective norm component.

All these direct measures can be altered as a result of changes made to their underlying salient beliefs. The selection of particular beliefs, in order to "attack" (Ajzen, 2008, p. 4) them in the intervention, could be an easy task when relying simply on the conception that the qualitative elicitation study (cf. chap. 4) delivered salient beliefs held by the target population, which was in fact its purpose; but the effective sample size of the elicitation study was small ($N = 40$), and the beliefs derived from it were complemented by some of the results presented by Wüstefeld-Würfel (1999; see chap. 5.4). Therefore, in order to optimize the efficiency of the procedure, it was deemed advisable to use additional, empirically derived, criteria to select only the most promising of the 20 beliefs underlying attitude toward the behavior and of the 10 beliefs underlying perceived behavioral control (cf., e.g., Armitage & Conner, 2002); one of these criteria can be the size of the significant β weights from the regression analyses for the indirect, belief-based, measures predicting the direct measures (see chap. 5.4 and Tables 32 and 33).

As was already pointed out in this text (see chap. 5.4 and 6.1), there are two major *behavioral* beliefs (referring to the aspects of fostering one's health and one's well-being) that predict the direct measure of the attitude toward mineral water intake, and two *control* beliefs (referring to the aspect of availability of mineral water in a person's habitat including his or her household) that predict the direct measure of perceived behavioral control. These four beliefs are positively correlated with their respective direct measures (see Appendix D, Tables D8 and D9); an intervention would aim at increasing the values of the behavioral beliefs or of the control beliefs. This can be achieved either by increasing behavioral or control belief strengths or by increasing the components by which these belief strengths are multiplied (i.e., outcome evaluations or control belief powers, respectively; Ajzen, 2008; Sutton, 2002). Given, however, the stronger impact of attitude toward the behavior on intention (as compared to perceived behavioral control; see Figure 6) and given the higher share of explained variance in the direct measure of attitude that is achieved by the indirect measures (as compared to perceived behavioral control; see Tables 32 and 33), primary attention should be given to the attitudinal pathway.

In a very similar vein, the PWM identified three weighted image components of mineral water that predict its intake: the same two aspects that emerged within the framework of the TPB (fostering one's health and one's well-being) and one referring to the calorie-free character of mineral water (see chap. 5.4 and 6.1). Although the focus of the TPB is on behavioral beliefs related to the consequences of *mineral water intake as a behavioral act* whereas in the framework of the PWM the focal point is the *image of mineral water as a product*, implications for interventions aimed at increasing mineral water intake are similar for both models. The PWM would suggest to increase the values of the three weighted image components by increasing the strengths of the beliefs that mineral water is a food product that fosters one's health and well-being and that it is free of calories or by increasing the values of the evaluation of the situation in terms of how important each of these attributes is for beverage intake in the natural environments students are living in. Increasing product-related beliefs, in turn, requires a shift in the positioning or in the image of mineral water, that is, in its perception by the target group.

The choice of an effective intervention *method* to be used in order to achieve a change in these dimensions "is where the investigator's experience and creativity comes into play.... We could consider persuasive communications, perhaps in the form of newspaper ads, flyers distributed in certain neighborhoods, or TV service messages. Alternatively, we might want to try face-to-face discussions, observational modeling, or any other applicable method" (Ajzen, 2008, pp. 2-3; see also 2005a). Basically, there are at least two strategies available for targeted interventions that are meant to address a subpopulation like university students in Germany: central and peripheral routes.

Public health nutrition and social marketing campaigns often base their interventions on *central route* persuasion which implies "a rational appeal to the consumer on the basis of factual information.... Public health nutrition campaign messages are often exhortations to healthy behaviours based on a logical thought process, with appeals to healthy eating behaviour on the principle of danger or damage to health" (Caraher & Landon, 2006, pp. 228-229). Interventions of this kind may increase knowledge or awareness, but whether they will lead to behavioral changes in a subpopulation in the long run is uncertain (Caraher & Landon, 2006; Pudel & Westenhöfer, 2003; cf. Bohner, 2001; Conner & Armitage, 2002; see also chap. 2.1). *Peripheral routes*, in contrast, "are based on the principles of feelings and identification being as important in the decision-making process as logical processes.... Peripheral approaches are less likely to be about the food itself and more to do with the values, *images* [italics added], branding, value for money and social values surrounding the food" (Caraher & Landon, 2006, p. 229). The food and advertising industries appear to be quite successful when taking this approach, which nonprofit organizations may be advised to take as well in order to enhance the efficacy of their campaigns (cf. Pudel &

Westenhöfer, 2003).

Apart from the option to change the strengths or powers of the *control beliefs* associated with the availability of mineral water in a person's habitat including his or her household, the present findings suggest that it may well be sensible to consider improving the *actual availability* of mineral water in students' habitats, provided such an action is within the scope of the person or organization carrying out the intervention. For example, mineral water producers might want to reconsider their distribution strategies or retailers their range of products on offer (cf., e.g., "Aktion 'Trinkfit - mach mit'", 2008). Interventions of this kind may be presumed to be efficient when looking at other studies that had the reversed goal or finding, respectively, of *reduced intake* of food items including water when the effort to obtain them was increased (e.g., Engell, Kramer, Malafi, Salomon, & Lesher, 1996; Meiselman, 2006; Meiselman, Hedderley, Staddon, Pierson, & Symonds, 1994; see also Kassem & Lee, 2004).

In addition, when tailoring a TPB-based intervention at the individual level, it might be worthwhile to encourage clients to form implementation intentions to make them more likely to actually enact the behavior they intend to perform. Implementation intentions may thus help to strengthen the relationship between intention and behavior. "Simply asking people when, where, and how they will carry out their intentions can greatly increase the likelihood that they will do so" (Ajzen, 2005a, p. 105; see also, e.g., Gratton, Povey, & Clark-Carter, 2007).

Although "attempts to utilize the TPB to design interventions have been few and far between" (Conner & Armitage, 2002, p. 52), the TPB appears to be a promising model for developing interventions and measuring their effects (e.g., Ajzen, 2005a, pp. 136-139; Conner & Armitage, 2002, pp. 51-53; Fife-Schaw, Sheeran, & Norman, 2007; Hardeman, Johnston, Johnston, Bonetti, Wareham, & Kinmonth, 2002; Rutter & Quine, 2002a).

6.5 Perspectives for Future Research

The present study was able to predict substantive shares of volume of mineral water intake in a sample of university students in Germany and managed to provide insights into the causes of interindividual differences in ingested volumes. A replication of the study would help to corroborate its findings; using a sample that is representative of the general population would make generalization of the findings possible. Setting up an intervention that tries to increase the values of the relevant beliefs in order to increase the dependent variables (i.e., intention to ingest mineral water and, eventually, mineral water intake) and evaluating its effectiveness would help to validate the present findings (cf., e.g., Ajzen, 2005a, p. 138; Conner & Armitage, 2002, pp. 50-51).

The present data set offers the opportunity to analyze intake data and setting-related data intraindividually and exploratively over the 7-day data collection period; this source of information has not been exploited in the present context. For example, covariation of volumes of beverages ingested across the days and even within the days across the 6 intervals that each day was divided into would deliver volumetric information about the temporal structure of a participant's relevant set of beverages; this information could be aligned with the interval-related times that were spent at home or out of home, respectively, or with the starting time or location of meals respondents reported to have had (see the beverage diary in Appendix B2). Furthermore, the present data may allow for a rough estimation of an individual's ingested volumes of particular nutrients, for example, alcohol.

Complementary objectives for further research into mineral water intake could be: (a) reinvestigation of determinants that did not turn out to be significant in this study but were found to have some predictive potential if operationalized more adequately (e.g., SES, physical activity, weather conditions, the spatial context of intake; see chap. 6.1 and 6.3), (b) investigation of "background factors" (Ajzen, 2005a, p. 135) like dietary restraint that may be modeled as constructs external to the TPB but with a theoretically sound hypothesis about their relationships with the predictors of behavioral intention within the framework of the TPB, or (c) in-depth investigation of mutual social interdependencies that affect mineral water intake between persons living together in the same household.

It is clearly not permissible to prematurely generalize the present findings to any other beverage than mineral water. Determinants that were found to be unrelated to volume of mineral water intake in the present study may well be identified as important predictors of ingested volumes of other beverages like, for example, alcoholic drinks, coffee, sodas, milk, or even tap water. The direction of influence of a specific predictor may also vary between beverages; dietary restraint, for instance, was found to be *positively* related to the image components of mineral water (see Appendix D, Table D13) but *negatively* to central image components of Coca Cola (Riepe & Lamprecht, 2001, p. 69). More research into the determinants of day-to-day intake of other beverages is thus warranted and will add supplementary pieces of information to the findings that this study has delivered so that, eventually, a comprehensive picture of the person- and situation-related determinants of beverage intake in general may emerge.

CHAPTER SEVEN

Summary

Since the beginning of humankind, eating and drinking have been amongst the most often repeated behavior patterns of all human beings. And throughout the history of humankind, in most regions and during most ages, everyday life was stamped by the experience of nutritional insecurity, shortage of foods, hunger, and famines. During their evolution, human beings have developed biological mechanisms and behavioral strategies to cope with nutritional insecurity and to counteract the recurring phases of food shortage. Thus, human beings are biologically and culturally well equipped to master the key task of *searching for and finding* food when there is *general lack* of it.

However, in many countries including Germany, the environmental conditions for performing nutrition behavior have undergone dramatic changes since the end of World War II. Within a period of less than a life-span, these changes have been pushing individuals ahead into a situation that their ancestors may have dreamed of as the land of cockaigne. As individuals are nowadays confronted with an overwhelming abundance of easily accessible food products, they are facing a new key task to ensure their physical survival: They are *forced to make decisions between food products* that are easily accessible in their natural environments. Unfortunately, individuals tend to be only badly prepared to cope with this new task.

A huge and ever-growing body of published research results related to human nutrition *behavior* has become available in the mean time, yet these findings are still fragmentary, they lack integration and coherence, and little effort can be observed to bring them together. The present text reviews general principles that control human nutrition behavior as well as specific determinants of food choice and food intake under conditions of abundance that have been found to have some explanatory power in previous research.

One of the central questions that were raised in 1975, the year when nutritional psychology was established in Germany, and which waits to be answered until today is: Why do people eat what they eat? Eating, in this context, encompasses normal, clinically inconspicuous, drinking behavior, a domain where less knowledge is available compared to that of the intake of solid foods. While the main research objectives of nutritional psychology have been in the field of primary prevention of nutrition-related diseases, it is challenged to increase its efforts to explore and understand *normal* eating and drinking behavior. Knowledge of everyday nutrition behavior may contribute to making preventive interventions more effective.

The purpose of the present study was to add a piece of empirically derived information to the small amount of existing knowledge in the field of drinking behavior. And the central question that guided the conception of the study was: How can the obvious interindividual differences in the volume of mineral water intake, which can be observed between ordinary people in their natural environments every day, be explained by drawing upon available psychological theories, models, concepts, instruments, and methods? The objective of this study was to check up on the usefulness of a number of person- and situation-related determinants that can be expected on theoretical grounds to have at least some potential for contributing to the analysis of these differences.

Eight *person-related* determinants were identified that were considered to be useful to attain this goal: (a) knowledge of the composition of mineral water and how it is manufactured; (b) dietary restraint; (c) variety-seeking tendency; (d) food neophobia; (e) attitude toward eating, that is, the importance of eating as measured with scale 1 of the Eating Behavior and Weight Problems Inventory; (f) mood and physical comfort; (g) socioeconomic status; and (h) time spent on physical activities. Three *situation-related* determinants were also addressed: (a) social interdependency of behavior and behavioral beliefs related to mineral water intake between persons living together in the same household, (b) the weather conditions and, in particular, the air temperature, and (c) the relative share of time a respondent spent at his or her home or out of it, respectively. Moreover, four *models of food choice* were tested: (a) the theory of planned behavior (TPB), (b) the theory of reasoned action (TRA), (c) an extension of the TPB, and (d) Pudel and Westenhöfer's model of cognitive decision making on foods (PWM).

For a successful application of the TPB and the TRA, it is of vital importance to construct the scales with which the theories' constructs are measured in such a way as to make them comprise the existing accessible, salient beliefs regarding the target behavior in the population. In order to achieve this aim, the salient behavioral outcomes, normative referents, and control factors were ascertained empirically from the target population in a qualitative elicitation study prior to constructing the corresponding scales for the subsequent quantitative main study.

The main study was set up as a prospective field study following a correlational research design. The main predictor variables were measured before the target behavior was performed and thus prior to the measurement of the dependent variables. Volume of beverage intake, in general, and that of mineral water intake, in particular, the target behavior, were ascertained in naturalistic settings as milliliters ingested per predefined interval by means of a 7-day structured diary. A naturalistic approach was chosen in order to ensure ecological validity and representativeness of the behavioral data. The dependent variables were intended to reflect actual behavior of persons ranging freely in their natural environments while retaining their daily routines. The quantitative main study was conducted between January and July 2002.

The only criteria respondents had to meet to be eligible for participation in the study were (a) being enrolled as a student in a university and (b) not having participated in a survey on beverage consumption within the past 12 months. Students of psychology, who were intended to make up ca 50% of the sample, received academic credit for their participation in the study; other students were paid an incentive (EUR 26). The effective sample size was $N = 179$.

Data obtained directly from the respondents were complemented by information derived from two external sources: (a) information about the habitual mineral water intake of other persons, if any, living together with a respondent in the same household as well as their behavioral belief strengths and outcome evaluations regarding mineral water intake were obtained; (b) weather information was gathered throughout the whole fieldwork time on a daily basis from the weather station at Hamburg Airport.

While the majority of the *person-related* determinants was not found to have a significant influence on volume of mineral water intake, the amount of knowledge of the composition of mineral water and how it is manufactured, the extent of dietary restraint, and the time spent on physical exercise could be established as single factors that exert a positive impact on day-to-day mineral water intake, although their influences were only very weak. Regarding the *situation-related* determinants, neither the share of time students spent at their homes or out of them, respectively, nor the weather was related to the volume of mineral water students ingested. However, a clear picture of mutual social influence between the respondents, on the one hand, and the persons with whom they were living together in the same household emerged: Students and the persons they were living with partly shared the informational foundation of the attitude toward mineral water intake. Also, habitual mineral water intake of both groups and actual mineral water intake of the students were mutually interrelated at the behavioral level.

Applications of the *models of food choice* demonstrated the usefulness of both the TPB and the PWM for modeling mineral water intake. According to the TPB, students tended to ingest high volumes of mineral water if they had a strong intention to do so. The strength of their intention, in turn, depended on the degree to which they held a favorable attitude toward ingesting mineral water and on the strength of the confidence they had in their capability of performing mineral water intake behavior (i.e., perceived behavioral control). The attitude toward the behavior was determined by the behavioral beliefs that mineral water intake fosters students' health and well-being; perceived behavioral control was dependent on the control beliefs students had regarding the availability of mineral water in their natural environments including their households. According to the PWM, three weighted image components related to mineral water turned out to determine the volume of its intake: being free of calories and fostering students' health and well-being.

It is speculated that there may still be a substantive influence of dietary restraint on mineral water intake, despite its weak *direct* impact on ingested volumes, but that this influence may be mediated at least by the beliefs underlying mineral water intake, because dietary restraint was found to be clearly correlated with the totality of both the behavioral beliefs in the TPB and the weighted image components in the PWM.

Limitations of the methodology used in this study are discussed, and implications for designing interventions based on the present findings as well as perspectives for future research are outlined.

References

Aikman, S. N., Min, K. E., & Graham, D. (2006). Food attitudes, eating behavior, and the information underlying food attitudes. *Appetite, 47,* 111-114.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 179-211.

Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology, 52,* 27-58.

Ajzen, I. (2002a). *Constructing a TpB questionnaire: Conceptual and methodological considerations.* Retrieved May 12, 2005, from http://www-unix.oit.umass.edu/~aizen/pdf/tpb.measurement.pdf

Ajzen, I. (2002b). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology, 32,* 665-683.

Ajzen, I. (2002c). Residual effects of past on later behavior: Habituation and reasoned action perspectives. *Personality and Social Psychology Review, 6,* 107-122.

Ajzen, I. (2005a). *Attitudes, personality and behavior.* Maidenhead, UK: Open University Press.

Ajzen, I. (2005b). Laws of human behavior: Symmetry, compatibility, and attitude-behavior correspondence. In A. Beauducel, B. Biehl, M. Bosnjak, W. Conrad, G. Schönberger, & D. Wagener (Eds.), *Multivariate research strategies* (pp. 3-19). Aachen, Germany: Shaker.

Ajzen, I. (2007). *The theory of planned behavior: A bibliography.* Retrieved June 25, 2007, from http://www-unix.oit.umass.edu/~aizen/tpbrefs.html

Ajzen, I. (2008). *Behavioral interventions based on the theory of planned behavior.* Retrieved April 29, 2008, from http://www-unix.oit.umass.edu/~aizen/pdf/tpb.intervention.pdf

Ajzen, I., & Driver, B. L. (1991). Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior. *Leisure Sciences, 13,* 185-204.

Ajzen, I., & Driver, B. L. (1992). Application of the theory of planned behavior to leisure choice. *Journal of Leisure Research, 24,* 207-224.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice-Hall.

Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. In W. Stroebe & M. Hewstone (Eds.), *European review of social psychology* (Vol. 11). Chichester, UK: Wiley. Draft version retrieved June 26, 2007, from http://www.people.umass.edu/aizen/ersp.html via email request [Note: cited page numbers differ from printed version]

Aktion "Trinkfit - mach mit" [Campaign "Trinkfit - join in"]. (2008, March). *Ernährungs-Umschau, 3/08,* 138.

Albarracín, D., Johnson, B. T., Fishbein, M., & Muellerleile, P. A. (2001). Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychological Bulletin, 127,* 142-161.

Amelang, M., & Bartussek, D. (2001). *Differentielle Psychologie und Persönlichkeitsforschung* [Differential psychology and research into personality]. Stuttgart, Germany: Kohlhammer.

Anderson, A. S., Milburn, K., & Lean, M. (1995). Food and nutrition: Helping the consumer understand. In D. Marshall (Ed.), *Food choice and the consumer* (pp. 105-128). London: Blackie Academic.

Anderson, E. S., Winett, R. A., & Wojcik, J. R. (2000). Social-cognitive determinants of nutrition behavior among supermarket food shoppers: A structural equation analysis. *Health Psychology, 19,* 479-486.

Andressen, B. M. (1996). *Barocke Tafelfreuden an Europas Höfen* [Baroque culinary delights at the courts of Europe]. Stuttgart, Germany: Belser.

Apollinaris & Schweppes (Ed.). (1994). *Wasserwerk: Wissenswertes über: Mineralwasser, Quellwasser, Tafelwasser, Heilwasser* [Waterworks: What is worth to know about: Mineral water, spring water, table water, water for medicinal purposes]. Frankfurt a.M., Germany: Deutscher Fachverlag.

Armitage, C. J., & Conner, M. (1999a). The theory of planned behaviour: Assessment of predictive validity and 'perceived control'. *British Journal of Social Psychology, 38,* 35-54.

Armitage, C. J., & Conner, M. (1999b). Distinguishing perceptions of control from self-efficacy: Predicting consumption of a low-fat diet using the theory of planned behavior. *Journal of Applied Social Psychology, 29,* 72-90.

Armitage, C. J., & Conner, M. (2001a). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology, 40,* 471-499.

Armitage, C. J., & Conner, M. (2001b). Social cognitive determinants of blood donation. *Journal of Applied Social Psychology, 31,* 1431-1457.

Armitage, C. J., & Conner, M. (2002). Reducing fat intake: interventions based on the theory of planned behaviour. In D. Rutter & L. Quine (Eds.), *Changing health behaviour - Intervention and research with social cognition models* (pp. 87-104). Maidenhead, UK: Open University Press.

Arvola, A., Lähteenmäki, L., & Tuorila, H. (1999). Predicting the intent to purchase unfamiliar and familiar cheeses: The effects of attitudes, expected liking and food neophobia. *Appetite, 32,* 113-126.

Arvola, A., Vassallo, M., Dean, M., Lampila, P., Saba, A., Lähteenmäki, L., et al. (2008). Predicting intentions to purchase organic food: The role of affective and moral attitudes in the theory of planned behaviour. *Appetite, 50,* 443-454.

Arzneimittelgesetz (2002). [German medicines act]. Retrieved March 22, 2006, from http://bundesrecht.juris.de/amg_1976/BJNR024480976.html

Axel Springer AG - Mediapilot. (2005). *Verbraucheranalyse* [Data file]. Available from Axel Springer AG web site, http://www.mediapilot.de/cda/index.php?cn=2&np=1&nt=3

Axelson, M. L., & Brinberg, D. (1989). *A social-psychological perspective on food-related behavior.* New York: Springer.

Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2006). *Multivariate Analysemethoden* [Multivariate methods for data analysis] (11th ed.). Berlin, Germany: Springer.

Bäckström, A., Pirttilä-Backman, A.-M., & Tuorila, H. (2004). Willingness to try new foods as predicted by social representations and attitude and trait scales. *Appetite, 43,* 75-83.

Bänsch, A. (1995). Variety seeking - Marketingfolgerungen aus Überlegungen und Untersuchungen zum Abwechslungsbedürfnis von Konsumenten [Variety seeking - Conclusions for product marketing from considerations of and research into consumers' desire for change]. *Jahrbuch der Absatz- und Verbrauchsforschung,* 342-365.

Bagozzi, R. P. (1994). Structural equation models in marketing research: Basic principles. In R. P. Bagozzi (Ed.), *Principles of marketing research* (pp. 317-385). Cambridge, MA: Blackwell.

Bagozzi, R. P., & Baumgartner, H. (1994). The evaluation of structural equation models and hypothesis testing. In R. P. Bagozzi (Ed.), *Principles of marketing research* (pp. 386-422). Cambridge, MA: Blackwell.

Balderjahn, I. (1998). Die Kreuzvalidierung von Kausalmodellen [Cross validation of causal models]. In L. Hildebrandt & C. Homburg (Eds.), *Die Kausalanalyse* (pp. 371-397). Stuttgart, Germany: Schäffer-Poeschel.

Balg, B. (2004). *Überblick über den alkoholfreien Getränkemarkt* [Overview on the market for non-alcoholic beverages]. Notes from a lecture held by F.-M. Belz, Technische Universität, München, Germany. Retrieved March 29, 2006, from http://www.food.wi.tum.de/upload/KonsumgutermarketingGetrankemarkt.pdf

Bandalos, D. L., & Finney, S. J. (2001). Item parceling issues in structural equation modeling. In G. A. Marcoulides & R. E. Schumacker (Eds.), *New developments and techniques in structural equation modeling* (pp. 269-296). Mahwah, NJ: Erlbaum.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.

Baranowski, T., Cullen, K. W., & Baranowski, J. (1999). Psychosocial correltates of dietary intake: Advancing dietary intervention. *Annual Review of Nutrition, 19,* 17-40.

Barker, L. M. (Ed.). (1983). *The psychobiology of human food selection.* Westport, CT: AVI Publishing Company.

Barker, M., Lawrence, W., Woadden, J., Crozier, S. R., & Skinner, T. C. (2008). Women of lower educational attainment have lower food involvement and eat less fruit and vegetables. *Appetite, 50,* 464-468.

Barlösius, E. (1999). *Soziologie des Essens* [Sociology of food]. Weinheim, Germany: Juventa.

Barlösius, E., Feichtinger, E., & Köhler, B. M. (Eds.). (1995). *Ernährung in der Armut* [Nutrition under conditions of poverty]. Berlin, Germany: Edition Sigma.

Bauch, A., Mensink, G. B. M., Vohmann, C., Stahl, A., Fischer, J., Kohler, S., et al. (2006). EsKiMo - Die Ernährungsstudie bei Kindern und Jugendlichen [EsKiMo - The nutrition study among children and adolescents]. *Ernährungs-Umschau, 53,* 380-385.

Bayer, O., Kutsch, T., & Ohly, H. P. (1999). *Ernährung und Gesellschaft* [Nutrition and society]. Opladen, Germany: Leske und Budrich.

Becker-Carus, C. (1983). Motivationale Grundlagen der Nahrungs- und Flüssigkeitsaufnahme [Motivational foundations of food and fluid intake]. In C. F. Graumann, T. Herrmann, H. Hörmann, M. Irle, H. Thomae, & F. E. Weinert (Eds.), *Enzyklopädie der Psychologie, Themenbereich C, Serie IV, Vol. 2. Psychologie der Motive* (pp. 12-69). Göttingen, Germany: Hogrefe.

Beglinger, C. (2002). Die Rolle des Gastrointestinaltraktes in der Regulation der Nahrungsaufnahme beim Menschen [The role of the GI tract in regulating the food intake in man]. *Aktuelle Ernährungsmedizin, 27,* 389-394.

Beitz, R., Mensink, G. B. M., Henschel, Y., Fischer, B., & Erbersdobler, H. F. (2004). Dietary behaviour of German adults differing in levels of sport activity. *Public Health Nutrition, 7,* 45-52.

Bell, R., & Meiselman, H. (1995). The role of eating environments in determining food choice. In D. Marshall (Ed.), *Food choice and the consumer* (pp. 292-310). London: Blackie Academic.

Bell, R., Meiselman, H. L., Pierson, B. J., & Reeve, W. G. (1994). Effects of adding an Italian theme to a restaurant on the perceived ethnicity, acceptability, and selection of foods. *Appetite, 22,* 11-24.

Benterbusch, R. (1999). Was essen die Sachsen? [What do people in Saxony eat?]. *Ernährungs-Umschau, 46,* 273.

Berg, C., Jonsson, I., & Conner, M. (2000). Understanding choice of milk and bread for breakfast among Swedish children aged 11-15 years : An application of the theory of planned behaviour. *Appetite, 34,* 5-19.

Beridot-Therond, M. E., Arts, I., Fantino, M., & Gueronniere, V. de la (1998). Short-term effects of the flavour of drinks on ingestive behaviours in man. *Appetite, 31,* 67-81.

Berry, S. L., Beatty, W. W., & Klesges, R. C. (1985). Sensory and social influences on ice cream consumption by males and females in a laboratory setting. *Appetite, 6,* 41-45.

Bestnoten für Trinkwasser [Best grades for tap water]. (2004, September). *Ernährungs-Umschau, 51,* pp. 383-384.

Birbaumer, N., & Schmidt, R. F. (2006). *Biologische Psychologie* [Biological psychology]. Heidelberg, Germany: Springer.

Birch, L. L. (1999). Development of food preferences. *Annual Review of Nutrition, 19,* 41-62.

Birch, L. L., Billman, J., & Richards, S. S. (1984). Time of day influences food acceptability. *Appetite, 5,* 109-116.

Birch, L. L., & Fisher, J. A. (1996). The role of experience in the development of children's eating behavior. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 113-141). Washington, DC: American Psychological Association.

Birch, L. L., McPhee, L., Shoba, B. C., Pirok, E., & Steinberg, L. (1987). What kind of exposure reduces children's food neophobia? Looking vs. tasting. *Appetite, 9,* 171-178.

Bisogni, C. A., Falk, L. W., Madore, E., Blake, C. E., Jastran, M., Sobal, J., et al. (2007). Dimensions of everyday eating and drinking episodes. *Appetite, 48,* 218-231.

Bitsch, I., Ehlert, T., & Ertzdorff, X. v. (Eds.). (1997). *Essen und Trinken in Mittelalter und Neuzeit* [Eating and drinking in mediaeval and modern times]. Wiesbaden, Germany: Albus im VMA.

Blanchard, C. M., Kupperman, J., Sparling, P. B., Nehl, E., Rhodes, R. E., Courneya, K. S., et al. (2009). Do ethnicity and gender matter when using the theory of planned behavior to understand fruit and vegetable consumption? *Appetite, 52,* 15-20.

Blue, C. L. (2007). Does the theory of planned behavior identify diabetes-related cognitions for intention to be physically active and eat a healthy diet? *Public Health Nursing, 24,* 141-150.

Blundell, J. E. (1999). The control of appetite: basic concepts and practical implications. *Schweizer Medizinische Wochenschrift, 129,* 182-188.

Bode, C., & Parlesak, A. (2001). Alkohol und Krebs [Alcohol and cancer]. *Aktuelle Ernährungsmedizin, 26,* 47-55.

Boës, U. (1997). Sind die Verbraucher verunsichert? [Do consumers really feel uncertain?]. In Auswertungs- und Informationsdienst für Ernährung, Landwirtschaft und Forsten (AID) (Ed.), *Ernährungsverhalten heute: Die Verbraucher sind verunsichert* (pp. 18-23). Bonn, Germany: Editor.

Börmann, W. (1986). *Erhebungen zur Entwicklung der Verbrauchermeinung und des Verbraucherverhaltens bei Konsummilch in der Bundesrepublik Deutschland* [Survey on the development of consumers' opinions about and consumers' behaviors towards milk in the Federal Republic of Germany]. Niederkleen, Germany: Fleck.

Bogers, R. P., Brug, J., van Assema, P., & Dagnelie, P. C. (2004). Explaining fruit and vegetable consumption: The theory of planned behaviour and misconception of personal intake levels. *Appetite, 42,* 157-166.

Bohner, G. (2001). Attitudes. In M. Hewstone & W. Stroebe (Eds.), *Introduction to social psychology* (pp. 239-282). Malden, MA: Blackwell.

Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology, 54,* 579-616.

Booth, D. A. (1994). *Psychology of nutrition.* London: Taylor & Francis.

Bortz, J. (1989). *Statistik für Sozialwissenschaftler* [Statistics for social scientists].

Berlin, Germany: Springer.

Bortz, J., & Döring, N. (2006). *Forschungsmethoden und Evaluation* [Research methods and evaluation]. Heidelberg, Germany: Springer.

Bortz, J., Lienert, G. A., & Boehnke, K. (1990). *Verteilungsfreie Methoden in der Biostatistik* [Non-parametric methods in biostatistics]. Berlin, Germany: Springer.

Bosello, O., & Di Francesco, V. (2007). *L'alimentazione* [Human nutrition]. Bologna, Italy: Il Mulino.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53,* 371-399.

Brombach, C., Wagner, U., Eisinger-Watzl, M., & Heyer, A. (2006). Die Nationale Verzehrsstudie II [The National Nutrition Survey II]. *Ernährungs-Umschau, 53,* 4-9.

Brouns, F. (1996). Trinken am Arbeitsplatz: Über die physiologische Bedeutung der Zusammensetzung von Getränken und Zusätzen für eine ideale Rehydration zur Optimalisierung der körperlichen und mentalen Leistungsfähigkeit [Drinking during work: Physiological significance of the composition of drinks and additives for optimization of physical and mental capacities]. *Aktuelle Ernährungsmedizin, 21,* 3-13.

Brown, R., & Barrett, P. (1999). Differences between applicant and non-applicant personality questionnaire data: Some implications for the creation and use of norm tables. In British Psychological Society (Ed.), *BPS Test User Conference Proceedings* (pp. 76-86). Leicester, UK: Editor.

Brug, J., de Vet, E., de Nooijer, J., & Verplanken, B. (2006). Predicting fruit consumption: Cognitions, intention, and habits. *Journal of Nutrition Education and Behavior, 38,* 73-81.

Bruhn, M. (2008). Lebensstilbasierte Segmentierung der Bevölkerung zur Ableitung zielgruppenspezifischer Verbraucherinformationskampagnen [Lifestyle characteristics and health promotion]. *Ernährungs-Umschau, 55,* 20-27.

Brunn, I. M. (2006). Psychobiologische Aspekte des Hungerstoffwechsels [Psychobiological aspects of starvation]. *Ernährungs-Umschau, 53,* 430-434.

Bundesverband der Deutschen Erfrischungsgetränke-Industrie. (1998). *Spektrum Trinken* (Issue No. 2). Bonn, Germany: Author.

Bundesverband der Deutschen Erfrischungsgetränke-Industrie. (2000). *Das Trink-Tagebuch* [The beverage diary]. Bonn, Germany: Author.

Bundschu, I. (1995). Ernährungssoziologie [Sociology of nutrition]. In I. Diedrichsen (Ed.), *Humanernährung* (pp. 80-120). Darmstadt, Germany: Steinkopff.

Burdach, K. J. (1988). *Geschmack und Geruch* [Taste and smell]. Bern, Switzerland: Huber.

Burger, M., & Mensink, G. B. M. (2004). High alcohol consumption in Germany: Results of the German national health interview and examination survey 1998. *Public Health Nutrition, 7,* 879-884.

Buse, L., & Pawlik, K. (1990). Verhaltenseinschätzung [Behavior rating]. In L. Kruse, C.-F. Graumann, & E.-D. Lantermann (Eds.), *Ökologische Psychologie* (pp. 213-217). München, Germany: PVU.

Buse, L., & Pawlik, K. (1991). Zur State-Trait-Charakteristik verschiedener Meßvariablen der psychophysiologischen Aktivierung, der kognitiven Leistung und der Stimmung in Alltagssituationen [State-Trait-Analysis of certain variables of psychophysiological activation, cognitive performance, and mood in everyday situations]. *Zeitschrift für experimentelle und angewandte Psychologie, 38,* 521-538.

Buse, L., & Pawlik, K. (1996). Konsistenz, Kohärenz und Situationsspezifität individueller Unterschiede [Consistency, coherence, and situation specificity of individual differences]. In N. Birbaumer, D. Frey, J. Kuhl, W. Prinz, & F. E. Weinert (Eds.), *Enzyklopädie der Psychologie, Themenbereich C, Serie VIII, Vol. 1. Grundlagen und Methoden der Differentiellen Psychologie* (pp. 269-300). Göttingen, Germany: Hogrefe.

Byrne, B. M. (1998). *Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming.* Mahwah, NJ: Erlbaum.

Cantin, I., & Dubé, L. (1999). Attitudinal moderation of correlation between food liking and consumption. *Appetite, 32,* 367-381.

Capaldi, E. D. (Ed.). (1996a). *Why we eat what we eat.* Washington, DC: American Psychological Association.

Capaldi, E. D. (1996b). Introduction. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 3-9). Washington, DC: American Psychological Association.

Capaldi, E. D. (1996c). Conditioned food preferences. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 53-80). Washington, DC: American Psychological Association.

Caprara, G. V., Barbaranelli, C., & Guido, G. (1998). Empirical investigations of determinants of purchase intention according to the theory of planned behavior. *Ricerche di Psicologia, 22,* 147-168.

Caraher, M., & Landon, J. (2006). The impact of advertising on food choice: The social context of advertising. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 227-245). Wallingford, UK: CABI.

Carle, R., & Schieber, A. (2006). Gewinnung funktioneller Lebensmittelinhaltsstoffe aus Reststoffen der Karottensaft- und Apfelsaftproduktion [Functional food components obtained from waste of carrot and apple juice production]. *Ernährungs-Umschau, 53,* 348-352.

Chatzisarantis, N. L. D., & Hagger, M. S. (2005). Effects of a brief intervention based on the theory of planned behavior on leisure-time physical activity participation. *Journal of Sport and Exercise Psychology, 27,* 470-487.

Chatzisarantis, N. L. D., Hagger, M. S., Smith, B., & Phoenix, C. (2004). The influences of continuation intentions on execution of social behaviour within the theory of planned behaviour. *British Journal of Social Psychology, 43,* 551-583.

Cheung, S. F., & Chan, D. K.-S. (2000). *The role of perceived behavioral control in predicting human behavior: A meta-analytic review of studies on the theory of planned behavior.* Unpublished manuscript, Chinese University, Hong Kong.

Clendenen, V. I., Herman, C. P., & Polivy, J. (1994). Social facilitation of eating among friends and strangers. *Appetite, 23,* 1-13.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Hillsdale, NJ: Erlbaum.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression / correlation analysis for the behavioral sciences.* Mahwah, NJ: Erlbaum.

Collins, S. E., & Carey, K. B. (2007). The theory of planned behavior as a model of heavy episodic drinking among college students. *Psychology of Addictive Behaviors, 21,* 498-507.

Colman, A. M. (2003). *A dictionary of psychology.* Oxford, UK: Oxford University Press.

Conner, M. (1994). Accounting for gender, age and socioeconomic differences in food choice. *Appetite, 23,* 195.

Conner, M. T. (1993). Individualized measurement of attitudes towards foods. *Appetite, 20,* 235-238.

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology, 28,* 1429-1464.

Conner, M., & Armitage, C. J. (2002). *The social psychology of food.* Buckingham, UK: Open University Press.

Conner, M., & Armitage, C. J. (2006). Social psychological models of food choice. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 41-57). Wallingford, UK: CABI.

Conner, M., Sheeran, P., Norman, P., & Armitage, C. J. (2000). Temporal stability as a moderator of relationships in the theory of planned behaviour. *British Journal of Social Psychology, 39,* 469-493.

Conner, M., Warren, R., Close, S., & Sparks, P. (1999). Alcohol consumption and the theory of planned behavior: An examination of the cognitive mediation of past behavior. *Journal of Applied Social Psychology, 29,* 1676-1704.

Cooke, L. J., Wardle, J., Gibson, E. L., Sapochnik, M., Sheiham, A., & Lawson, M. (2004). Demographic, familial and trait predictors of fruit and vegetable consumption by pre-school children. *Public Health Nutrition, 7,* 295-302.

Corbetta, P. (2002). *Metodi di analisi multivariata per le scienze sociali* [Methods of multivariate analysis for the social sciences]. Bologna, Italy: Il Mulino.

Courneya, K. S. (1995). Understanding readiness for regular physical activity in older individuals: An application of the theory of planned behavior. *Health Psychology, 14,* 80-87.

Cox, D. N., & Anderson, A. S. (2004). Food choice. In M. J. Gibney, B. M. Margetts, J. M. Kearney, & L. Arab (Eds.), *Public health nutrition* (pp. 144-166). Oxford, UK: Blackwell Science.

Daschner, F. (1996). Wie gesund ist Mineral- oder Heilwasser? [How healthy is mineral water or water for medicinal purposes?]. *Aktuelle Ernährungsmedizin, 21,* 171-173.

Davidson, R. J. (1994). On emotion, mood, and related affective constructs. In P. Ekman & R. J. Davidson (Eds.), *The nature of emotion* (pp. 51-55). New York: Oxford University Press.

Davis, C., Patte, K., Levitan, R., Reid, C., Tweed, S., & Curtis, C. (2007). From motivation to behaviour: A model of reward sensitivity, overeating, and food preferences in the risk profile for obesity. *Appetite, 48,* 12-19.

de Bruijn, G.-J., Kremers, S. P. J., de Vries, H., van Mechelen, W., & Brug, J. (2007). Associations of social-environmental and individual-level factors with adolescent soft drink consumption: results from the SMILE study. *Health Education Research, 22,* 227-237.

de Bruijn, G.-J., Kroeze, W., Oenema, A., & Brug, J. (2008). Saturated fat consumption and the theory of planned behaviour: Exploring additive and interactive effects of habit strength. *Appetite, 51,* 318-323.

De Castro, J. M. (1994). Methodology, correlational analysis, and interpretation of diet diary records of the food and fluid intake of free-living humans. *Appetite, 23,* 179-192.

De Castro, J. M. (1995a). The relationship of cognitive restraint to the spontaneous food and fluid intake of free-living humans. *Physiology and Behavior, 57,* 287-295.

De Castro, J. M. (1995b). Social facilitation of food intake in humans. *Appetite, 24,* 260.

De Castro, J. M., Brewer, E. M., Elmore, D. K., & Orozco, S. (1990). Social facilitation of the spontaneous meal size of humans occurs regardless of time, place, alcohol or snacks. *Appetite, 15,* 89-101.

Deliza, R., & MacFie, H. J. H. (1996). The generation of sensory expectation by external cues and its effect on sensory perception and hedonic ratings: A review. *Journal of Sensory Studies, 11,* 103-128.

DeLongis, A., Hemphill, K. J., & Lehman, D. R. (1992). A structured diary methodology for the study of daily events. In F. B. Bryant, J. Edwards, R. S. Tindale, E. J. Posavac, L. Heath, E. Henderson, et al. (Eds.), *Methodological issues in applied social psychology* (pp. 83-109). New York: Plenum.

Deutsche Gesellschaft für Ernährung (DGE) (Ed.). (1988). *Ernährungsbericht 1988* [Nutrition report 1988]. Frankfurt a.M., Germany: Editor.

Deutsche Gesellschaft für Ernährung (DGE) (Ed.). (2000a). *Referenzwerte für die Nährstoffzufuhr* [Reference values for the supply of nutrients]. Frankfurt a.M., Germany: Umschau Braus.

Deutsche Gesellschaft für Ernährung (DGE) (Ed.). (2002). *Der Mensch ist, was er isst* [You are what you eat]. Bonn, Germany: Editor.

Deutsche Gesellschaft für Ernährung (DGE) (Ed.). (2004). *Ernährungsbericht 2004* [Nutrition report 2004]. Bonn, Germany: Editor.

deVries, M. W. (Ed.). (1992). *The experience of psychopathology: Investigating mental disorders in their natural settings.* Cambridge, UK: Cambridge University Press.

Diedrichsen, I. (1990). *Ernährungspsychologie* [Psychology of nutrition]. Berlin, Germany: Springer.

Diedrichsen, I. (Ed.). (1995a). *Humanernährung* [Human nutrition]. Darmstadt, Germany: Steinkopff.

Diedrichsen, I. (1995b). Ernährungspsychologie [Psychology of nutrition]. In I. Diedrichsen (Ed.), *Humanernährung* (pp. 37-79). Darmstadt, Germany: Steinkopff.

Diehl, J. M. (1980). *Ernährungspsychologie* [Psychology of nutrition]. Frankfurt a.M., Germany: Fachbuchhandlung für Psychologie.

Diehl, J. M. (1993). Ernährungspsychologie [Psychology of nutrition]. In T. Kutsch (Ed.), *Ernährungsforschung - interdisziplinär* (pp. 68-97). Darmstadt, Germany: Wissenschaftliche Buchgesellschaft.

Diehl, J. M. (1996). Umfang und Determinanten des Konsums alkoholischer Getränke [Extent and determinants of alcohol consumption]. *Aktuelle Ernährungsmedizin, 21,* 45-55.

Diehl, J. M., & Bloh, E. (1985). Altersunterschiede im Konsum alkoholfreier Getränke - Literaturübersicht [Age differences in the consumption of non-alcoholic beverages - A review of the literature]. *Aktuelle Ernährungsmedizin, 10,* 160-171.

Diehl, J. M., Bloh, E., & Swidersky, J. (1985). Altersunterschiede im Konsum alkoholischer Getränke - Literaturübersicht [Age differences in the consumption of alcoholic beverages - A review of the literature]. *Aktuelle Ernährungsmedizin, 10,* 199-211.

Diehl, J. M., & Elmadfa, I. (1987). Getränkekonsum und Schulbildung [Beverage intake and education]. *Aktuelle Ernährungsmedizin, 12,* 39-50.

Diehl, J. M., Elmadfa, I., & Walter, B. (1985). Struktur und Ausprägung der Getränkepräferenzen von Erwachsenen [Structure and distribution of beverage preferences in adults]. *Aktuelle Ernährungsmedizin, 10,* 34-41.

Diehl, J. M., & Leitzmann, C. (Eds.). (1985). *Measurement and determinants of food habits and food preferences: Report of an EC Workshop, Giessen, West-Germany, 1-4 May 1985* (Euro-Nut report; 7). Wageningen, The Netherlands: Stichting Nederlands Instituut voor de Voeding.

Diehl, J. M., & Paul, T. (1985). Relativgewicht und Persönlichkeit - Analysen mit dem Freiburger Persönlichkeitsinventar [Relative weight and personality - Analyses with the Freiburg Personality Inventory]. *Aktuelle Ernährungsmedizin, 10,* 14-23.

Diehl, J. M., Paul, T., & Daum, I. (1984). Relativgewicht und Persönlichkeit - Literaturübersicht [Relative weight and personality - A review of the literature]. *Aktuelle Ernährungsmedizin, 9,* 220-232.

Diehl, J. M., & Staufenbiel, T. (1994). *Inventar zum Eßverhalten und Gewichtsproblemen IEG* [Eating behavior and weight problems inventory EWI]. Eschborn, Germany: Dietmar Klotz.

Di Natale, R., & Saba, A. (1997). Studio di alcune determinanti delle scelte alimentari con il modello LISREL [LISREL models to study the determinants of food choice]. *Statistica Applicata, 9,* 473-488.

Dohmen, P. (1985). Zur Bedeutung bilinearer Einstellungsmodelle [On the meaningfulness of bilinear attitude models]. *Zeitschrift für Sozialpsychologie, 16,* 240-252.

Dohmen, P., Doll, J., & Orth, B. (1986). Modifizierte Produktsummenmodelle und ihre empirische Prüfung in der Einstellungsforschung [Modified product-summation-models and their empirical test in the domain of attitude research]. *Zeitschrift für Sozialpsychologie, 17,* 109-118.

Doll, J., & Orth, B. (1993). The Fishbein and Ajzen theory of reasoned action applied to contraceptive behavior: Model variants and meaningfulness. *Journal of Applied Social Psychology, 23,* 395-415.

Donkin, A. J. M., Johnson, A. E., Lilley, J. M., Morgan, K., Neale, R. J., Page, R. M., et al. (1998). Gender and living alone as determinants of fruit and vegetable consumption among the elderly living at home in urban Nottingham. *Appetite, 30,* 39-51.

Dovey, T. M., Staples, P. A., Gibson, E. L., & Halford, J. C. G. (2008). Food neophobia and 'picky/fussy' eating in children: A review. *Appetite, 50,* 181-193.

Downs, D. S. (2006). Understanding exercise intention in an ethnically diverse sample of postpartum women. *Journal of Sport and Exercise Psychology, 28,* 159-170.

Downs, D. S., & Hausenblas, H. A. (2005). Elicitation studies and the theory of planned behavior: A systematic review of exercise beliefs. *Psychology of Sport & Exercise, 6,* 1-31.

Drewnowski, A. (1997). Taste preferences and food intake. *Annual Review of Nutrition, 17,* 237-253.

Drewnowski, A., & Hann, C. (1999). Food preferences and reported frequencies of food consumption as predictors of current diet in young women. *American Journal of Clinical Nutrition, 70,* 28-36.

Duffy, V. B., & Bartoshuk, L. M. (1996). Sensory factors in feeding. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 145-171). Washington, DC: American Psychological Association.

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes.* Fort Worth, TX: Harcourt Brace Jovanovich College.

Edelman, B., Engell, D., Bronstein, P., & Hirsch, E. (1986). Environmental effects on the intake of overweight and normal-weight men. *Appetite, 7,* 71-83.

Edwards, J. S. A., Meiselman, H. L., Edwards, A., & Lesher, L. (2003). The influence of eating location on the acceptability of identically prepared foods. *Food Quality and Preference, 14,* 647-652.

Eid, M., Schneider, C., & Schwenkmezger, P. (1999). Do you feel better or worse? The validity of perceived deviations of mood states from mood traits. *European Journal of Personality, 13,* 283-306.

Ekman, P. (1994). Moods, emotions, and traits. In P. Ekman & R. J. Davidson (Eds.), *The nature of emotion* (pp. 56-58). New York: Oxford University Press.

Elmadfa, I., & Hühn, W. (1985). Consumption and preference of drinking water. In J. M. Diehl & C. Leitzmann (Eds.), *Measurement and determinants of food habits and food preferences: Report of an EC Workshop, Giessen, West-Germany, 1-4 May 1985* (Euro-Nut report; 7; pp. 129-135). Wageningen, The Netherlands: Stichting Nederlands Instituut voor de Voeding.

Engell, D. (1988). Interdependency of food and water intake in humans. *Appetite, 10,* 133-141.

Engell, D., & Hirsch, E. (1991). Environmental and sensory modulation of fluid intake in humans. In D. J. Ramsay & D. Booth (Eds.), *Thirst: Physiological and psychological aspects* (pp. 382-390). London: Springer.

Engell, D., Kramer, M., Malafi, T., Salomon, M., & Lesher, L. (1996). Effects of effort and social modeling on drinking in humans. *Appetite, 26,* 129-138.

Epstein, S. (1979). The stability of behavior: I. On predicting most of the people much of the time. *Journal of Personality and Social Psychology, 37,* 1097-1126.

Epstein, S. (1980). The stability of behavior: II. Implications for psychological research. *American Psychologist, 35,* 790-806.

Epstein, S. (1983). Aggregation and beyond: Some basic issues on the prediction of behavior. *Journal of Personality, 51,* 360-392.

Epstein, S., & O'Brien, E. J. (1985). The person-situation debate in historical and current perspective. *Psychological Bulletin, 98,* 513-537.

Erichson, B. (1999). Testmarktsimulation [Simulated test market]. In A. Herrmann & C. Homburg (Eds.), *Marktforschung* (pp. 789-808). Wiesbaden, Germany: Gabler.

Ernährungswissen junger Konsumenten [Nutrition knowledge in adolescents and young adults]. (2005, April). *Ernährungs-Umschau, 4/2005,* B15-B16.

Evans, M. G. (1991). The problem of analyzing multiplicative composites: Interactions revisited. *American Psychologist, 46*(1), 6-15.

Everson, E. S., Daley, A. J., & Ussher, M. (2007). Brief report: The theory of planned behaviour applied to physical activity in young people who smoke. *Journal of Adolescence, 30,* 347-351.

Faber, C. (1996). *Ernährungsverhalten von Abiturienten* [Nutrition behavior of high school graduates]. Unpublished doctoral dissertation, University of Gießen, Germany.

Falahee, M., & MacRae, A. W. (1995). Consumer appraisal of drinking water: Multidimensional scaling analysis. *Food Quality and Preference, 6,* 327-332.

Falahee, M., & MacRae, A. W. (1997). Perceptual variation among drinking waters: The reliability of sorting and ranking data for multidimensional scaling. *Food Quality and Preference, 8,* 389-394.

Falciglia, G. A., Couch, S. C., Gribble, L. S., Pabst, S. M., & Frank, R. (2000). Food neophobia in childhood affects dietary variety. *Journal of the American Dietetic Association, 100,* 1474-1481.

Feichtinger, E., & Köhler, B. M. (Eds.). (1995). *Current research into eating practices.* Frankfurt a.M., Germany: Umschau.

Felser, G. (2007). Vielschichtigkeit gefordert: Psychologie für den ganzen Konsumenten [Demanding complexity: Psychology for the whole consumer]. *Wirtschafts-*

psychologie aktuell, 14 (4), 19-22.

Ferrier, C. (2001). *Bottled water: Understanding a social phenomenon* (Discussion paper commissioned by WWF). Retrieved April 25, 2006, from http://www.panda.org/livingwaters/pubs/bottled_water.pdf

Fife-Schaw, C., Sheeran, P., & Norman, P. (2007). Simulating behaviour change interventions based on the theory of planned behaviour: Impacts on intention and action. *British Journal of Social Psychology, 46,* 43-68.

Fila, S. A., & Smith, C. (2006). Applying the theory of planned behavior to healthy eating behaviors in urban native American youth. *International Journal of Behavioral Nutrition and Physical Activity, 3.* Retrieved May 18, 2007, from http://www.ijbnpa.org/content/3/1/11

Fincham, F., & Hewstone, M. (2001). Attribution theory and research: From basic to applied. In M. Hewstone & W. Stroebe (Eds.), *Introduction to social psychology* (pp. 197-238). Malden, MA: Blackwell.

Finlay, K. A., Trafimow, D., & Villarreal, A. (2002). Predicting exercise and health behavioral intentions: Attitudes, subjective norms, and other behavioral determinants. *Journal of Applied Social Psychology, 32,* 342-358.

Fischer, J. (1999). *Mein langer Lauf zu mir selbst* [The long-distance run to my self]. Köln, Germany: Kiepenheuer & Witsch.

Fisher, J. O., & Birch, L. L. (1999). Restricting access to foods and children's eating. *Appetite, 32,* 405-419.

Flight, I., Leppard, P., & Cox, D. N. (2003). Food neophobia and associations with cultural diversity and socio-economic status amongst rural and urban Australian adolescents. *Appetite, 41,* 51-59.

Försterling, F. (2001). *Attribution - An introduction to theories, research, and applications.* Hove, UK: Psychology Press.

Food and Agriculture Organization of the United Nations [FAO] (Ed.). (2005). *The state of food insecurity in the world 2005.* Retrieved November 24, 2005, from ftp://ftp.fao.org/docrep/fao/008/a0200e/a0200e.pdf

Food and Agriculture Organization of the United Nations [FAO] (2008, July). *About*

50 million more hungry people in 2007. Retrieved July 13, 2008, from http://www.fao.org/newsroom/en/news/2008/1000866/index.html

Forum Trinkwasser. (n.d. a). *Trinkwasser als Lebensmittel - Verwendung im Haushalt* [Drinking water as food - Usage in the household]. Retrieved March 23, 2006, from http://www.forum-trinkwasser.de/trinkwasseralslebensmittel/verwendungimhaushalt.html

Forum Trinkwasser. (n.d. b). *Trinkwasser als Lebensmittel - Ernährungsphysiologische Bedeutung* [Drinking water as food - Nutritional relevance]. Retrieved May 5, 2006, from http://www.forum-trinkwasser.de/trinkwasseralslebensmittel/ernaehrungsphysiologischebedeutung.html

Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., et al. (2004). *Constructing questionnaires based on the theory of planned behaviour.* Newcastle upon Tyne, UK: Centre for Health Services Research, University of Newcastle. Retrieved May 12, 2005, from http://www.rebeqi.org/?pageID=40&ItemID=86

Frijda, N. H. (1994). Varieties of affect: Emotions and episodes, moods, and sentiments. In P. Ekman & R. J. Davidson (Eds.), *The nature of emotion* (pp. 59-67). New York: Oxford University Press.

Fuchs, R. (2005). Körperliche Aktivität [Physical activity]. In N. Birbaumer, D. Frey, J. Kuhl, W. Schneider, & R. Schwarzer (Eds.), *Enzyklopädie der Psychologie, Themenbereich C, Serie X, Vol. 1. Gesundheitspsychologie* (pp. 447-465). Göttingen, Germany: Hogrefe.

Funder, D. C. (2001). Personality. *Annual Review of Psychology, 52,* 197-221.

Furnham, A., & Lovett, J. (2001). Predicting the use of complementary medicine: A test of the theories of reasoned action and planned behavior. *Journal of Applied Social Psychology, 31,* 2588-2620.

Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice: A conceptual model of the process. *Appetite, 26,* 247-266.

Galef, B. G., Jr. (1996). Social influences on food preferences and feeding behaviors of vertebrates. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 207-231). Washington, DC: American Psychological Association.

Galloway, A. T., Lee, Y., & Birch, L. L. (2003). Predictors and consequences of food neophobia and pickiness in young girls. *Journal of the American Dietetic Association, 103,* 692-698.

Gay, C. (2000). Estimation of population distributions of habitual nutrient intake based on a short-run weighed food diary. *British Journal of Nutrition, 83,* 287-293.

Gedrich, K. (2003). Determinants of nutritional behaviour: A multitude of levers for successful intervention? *Appetite, 41,* 231-238.

Georgiou, C. C., Betts, N. M., Hoerr, S. L., Keim, K., Peters, P. K., Stewart, B., et al. (1997). Among young adults, college students and graduates practiced more healthful habits and made more healthful food choices than did nonstudents. *Journal of the American Dietetic Association, 97,* 754-759.

Gibney, M. J., Margetts, B. M., Kearney, J. M., & Arab, L. (Eds.). (2004). *Public health nutrition*. Oxford, UK: Blackwell Science.

Gibson, E. L. (2006). Mood, emotions and food choice. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 113-140). Wallingford, UK: CABI.

Gibson, E. L., Wardle, J., & Watts, C. J. (1998). Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite, 31,* 205-228.

Giles, M., Connor, S., McClenahan, C., Mallett, J., Stewart-Knox, B., & Wright, M. (2007). Measuring young people's attitudes to breastfeeding using the theory of planned behaviour. *Journal of Public Health, 29,* 17-26.

Giskes, K., Turrell, G., Patterson, C., & Newman, B. (2002). Socioeconomic differences among Australian adults in consumption of fruit and vegetables and intakes of vitamins A, C and folate. *Journal of Human Nutrition & Dietetics, 15,* 375-385.

Gniech, G. (2002). *Essen und Psyche* [Eating and psyche]. Berlin, Germany: Springer.

Gniech, G., & Schepers, E.-M. (1987). *Nahrungspräferenzen und -aversionen als Indikator einer somato-psychosozialen Ganzheit* [Food preferences and aversions as indicators of a somatic-psychosocial wholeness] (Bremer Beiträge zur Psychologie Nr. 68). Bremen, Germany: University of Bremen, SG Psychologie.

Godin, G., & Kok, G. (1996). The theory of planned behavior: A review of its applications to health-related behaviors. *American Journal of Health Promotion, 11,* 87-98.

Gölz, C. (1997). *Gesundheitspsychologische Aspekte des Ernährungsverhaltens* [Health psychological aspects of nutrition behavior]. Lage, Germany: Hans Jacobs.

Graf, P., & Uttl, B. (1995). Component processes of memory: Changes across the adult lifespan. *Swiss Journal of Psychology*, 54, 113-130.

Gratton, L., Povey, R., & Clark-Carter, D. (2007). Promoting children's fruit and vegetable consumption: Interventions using the theory of planned behaviour as a framework. *British Journal of Health Psychology, 12,* 639-650.

Grobe, E. (1999). *Erlebnissphären im Essen* [Spheres of experiences with eating]. Unpublished master's thesis, University of Hamburg, Germany.

Grogan, S. C., Bell, R., & Conner, M. (1997). Eating sweet snacks: Gender differences in attitudes and behaviour. *Appetite, 28,* 19-31.

Grunert, K. G. (2006). Marketing parameters and their influence on consumer food choice. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 161-177). Wallingford, UK: CABI.

Grunert, S. C. (1989). Ein Inventar zur Erfassung von Selbstaussagen zum Ernährungsverhalten [An inventory for measuring self-statements on eating behavior]. *Diagnostica, 35,* 167-179.

Grunert, S. C. (1993). *Essen und Emotionen* [Eating and emotions]. Weinheim, Germany: Beltz - PVU.

Guinard, J.-X., Souchard, A., Picot, M., Rogeaux, M., & Sieffermann, J.-M. (1998). Sensory determinants of the thirst-quenching character of beer. *Appetite, 31,* 101-115.

Gulliksen, H. (1950). *Theory of mental tests.* New York: Wiley.

Hagen, M., & Schmahl, F. W. (1996). Säfte - Limonaden - Mineralwasser: Ernährungsphysiologische und wirtschaftliche Aspekte [Juices - Lemonades - Mineral water - Aspects of economy and nutritional physiology]. *Aktuelle Ernährungs-medizin, 21,* 34-39.

Hansen, T., Jensen, J. M., & Solgaard, H. S. (2004). Predicting online grocery buying intention: A comparison of the theory of reasoned action and the theory of planned behavior. *International Journal of Information Management, 24,* 539-550.

Hardeman, W., Johnston, M., Johnston, D., Bonetti, D., Wareham, N., & Kinmonth, A. L. (2002). Application of the theory of planned behaviour in behaviour change interventions: A systematic review. *Psychology and Health, 17,* 123-158.

Haseborg, F. ter, & Mäßen, A. (1997). Das Phänomen des Variety-Seeking-Behavior: Modellierung, empirische Befunde und marketingpolitische Implikationen [The phenomenon of variety-seeking behavior: Modeling, empirical findings, and implications for marketing policy]. *Jahrbuch der Absatz- und Verbrauchsforschung,* 164-188.

Hatt, H. (1997). Geschmack und Geruch [Taste and smell]. In R. F. Schmidt & G. Thews (Eds.), *Physiologie des Menschen* (pp. 316-327). Berlin, Germany: Springer.

Hauber-Schwenk, G., & Schwenk, M. (2000). *dtv-Atlas Ernährung* [dtv-Nutrition atlas]. München, Germany: dtv.

Havermans, R. C., & Jansen, A. (2007). Increasing children's liking of vegetables through flavour-flavour learning. *Appetite, 48,* 259-262.

Havermans, R. C., Janssen, T., Giesen, J. C. A. H., Roefs, A., & Jansen, A. (2009). Food liking, food wanting, and sensory-specific satiety. *Appetite, 52,* 222-225.

Hayn, D. (2008). Ernährungshandeln im Alltag [Daily nutritional practice]. *Ernährungs-Umschau, 55,* 346-351.

Hayn, D., Empacher, C., & Halbes, S. (2005). *Ernährungswende - Trends und Entwicklungen von Ernährung im Alltag* [Turning point in nutrition - Trends and developments of nutrition in everyday life]. Frankfurt a. M., Germany: Institut für sozial-ökologische Forschung (ISOE). Retrieved August 10, 2005, from http://www.isoe.de/ftp/mb2_TrendsErnAlltag.pdf

Hebebrand, J. (2005). Ist Dicksein erblich? [Is obesity heritable?]. *Ernährungs-Umschau, 52,* 90-92.

Hedges, S.M., Jandorf, L., & Stone, A.M. (1985). Meaning of daily mood assessments. *Journal of Personality and Social Psychology, 48,* 428-434.

Heidenreich, K. (1987). Entwicklung von Skalen [Scale development]. In E. Roth (Ed.), *Sozialwissenschaftliche Methoden* (pp. 417-449). München, Germany: Oldenbourg.

Helmig, B. (2001). Der Einfluss der Nicht-Erhältlichkeit einer ursprünglich gewünschten Marke auf die Abwechslungsneigung bei der Produktwahl [The impact of non-availability of an originally preferred brand on variety-seeking tendency when choosing a product]. *Jahrbuch der Absatz- und Verbrauchsforschung,* 310-328.

Henrichsmeier, A., & Grothe, B. (1997). *Repräsentative Befragung zum Trinkverhalten in Deutschland* [Representative survey on drinking behavior in Germany]. Unpublished master's thesis, University of Bonn, Germany.

Henriques, A. S., King, S. C., & Meiselman, H. L. (2009). Consumer segmentation based on food neophobia and its application to product development. *Food Quality and Preference, 20,* 83-91.

Herman, C. P., & Polivy, J. (1975). Anxiety, restraint, and eating behavior. *Journal of Abnormal Psychology, 84,* 666-672.

Hetherington, M. M., & Rolls, B. J. (1996). Sensory-specific satiety: Theoretical frameworks and central characteristics. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 267-290). Washington, DC: American Psychological Association.

Hetherington, M., Rolls, B. J., & Burley, V. J. (1989). The time course of sensory-specific satiety. *Appetite, 12,* 57-68.

Hewitt, A. M., & Stephens, C. (2007). Healthy eating among 10 - 13-year-old New Zealand children: Understanding choice using the theory of planned behaviour and the role of parental influence. *Psychology, Health and Medicine, 12,* 526-535.

Hilbig, A., Heuer, T., Krems, C., Straßburg, A., Eisinger-Watzl, M., Heyer, A., et al.

(2009). Wie isst Deutschland? - Auswertungen der Nationalen Verzehrsstudie II zum Lebensmittelverzehr [What does Germany eat? - Evaluation of the Second National Diet Study (NVS II)]. *Ernährungs-Umschau, 56,* 16-23.

Hildebrandt, L., & Homburg, C. (Eds.). (1998). *Die Kausalanalyse* [Causal analysis]. Stuttgart, Germany: Schäffer-Poeschel.

Hill, A. J., Weaver, C. F. L., & Blundell, J. E. (1991). Food craving, dietary restraint and mood. *Appetite, 17,* 187-197.

Hoffmann, J. (1999). Kognitive Psychologie [Cognitive psychology]. In R. Asanger & G. Wenninger (Eds.), *Handwörterbuch Psychologie* (pp. 352-356). Weinheim, Germany: Beltz - PVU.

Holbrook, M. B. (1977). Comparing multiattribute attitude models by optimal scaling. *Journal of Consumer Research, 4,* 165-171.

Homburg, C. (Ed.). (2001). *Kundenzufriedenheit* [Customer satisfaction]. Wiesbaden, Germany: Gabler.

Homburg, C., & Baumgartner, H. (1998). Beurteilung von Kausalmodellen [Assessment of causal models]. In L. Hildebrandt & C. Homburg (Eds.), *Die Kausalanalyse* (pp. 343-369). Stuttgart, Germany: Schäffer-Poeschel.

Homburg, C., & Giering, A. (1998). Konzeptualisierung und Operationalisierung komplexer Konstrukte [Conceptualisation and operationalisation of complex constructs]. In L. Hildebrandt & C. Homburg (Eds.), *Die Kausalanalyse* (pp. 111-146). Stuttgart, Germany: Schäffer-Poeschel.

Homburg, C., & Pflesser, C. (1999). Strukturgleichungsmodelle mit latenten Variablen - Kausalanalyse [Structural equation models with latent variables - Causal analysis]. In A. Herrmann & C. Homburg (Eds.), *Marktforschung* (pp. 633-659). Wiesbaden, Germany: Gabler.

Hormuth, S. E. (1986). The sampling of experiences in situ. *Journal of Personality, 54,* 262-293.

Hoyer, S. W. (2003). *Prädiktiver Wert sensorischer Laboruntersuchungen für den Getränkekonsum älterer Menschen unter Alltagsbedingungen* [Predictive validity of laboratory research into sensory properties of foods for day-to-day beverage consumption in the elderly]. Unpublished doctoral dissertation, University of Potsdam, Germany.

Hradil, S. (2001). *Soziale Ungleichheit in Deutschland* [Social inequality in Germany]. Wiesbaden, Germany: Verlag für Sozialwissenschaften / GWV Fachverlage.

Huchting, K., Lac, A., & LaBrie, J. W. (2008). An application of the theory of planned behavior to sorority alcohol consumption. *Addictive Behaviors, 33,* 538-551.

Hudson, R., & Distel, H. (1999). The flavor of life: perinatal development of odor and taste preferences. *Schweizer Medizinische Wochenschrift, 129,* 176-181.

Hühn, W. (1993). *Der Stellenwert des Trinkwassers in der Ernährung des Menschen* [The relevance of drinking water for human nutrition]. Unpublished doctoral dissertation, University of Gießen, Germany.

Hulshof, K. F. A. M., Löwik, M. R. H., Kistemaker, C., Ockhuizen, T., & Hermus, R. J. J. (1995). Socioeconomic variation in eating patterns, food variety and dietary adequacy in the Netherlands. In E. Feichtinger & B. M. Köhler (Eds.), *Current research into eating practices* (pp. 29-31). Frankfurt a.M., Germany: Umschau.

Hunter, D. R., Martinussen, M., & Wiggins, M. (2003). Understanding how pilots make weather-related decisions. *International Journal of Aviation Psychology, 13,* 73-87.

Hupkens, C. L. H., Knibbe, R. A., Drop, M. J., Diederiks, J. P. M., Stevens, F. C. J., & Lüschen, G. (1995). Sociocultural determinants of eating and drinking habits: An international comparison. In E. Feichtinger & B. M. Köhler (Eds.), *Current research into eating practices* (pp. 21-25). Frankfurt a.M., Germany: Umschau.

Informationszentrale Deutsches Mineralwasser (IDM) (Ed.). (2003). *Mineralwasser - Wissenswertes für die Ernährungsberatung* [Mineral water - What is worth to know for nutrition education]. Bonn, Germany: Editor.

Informationszentrale Deutsches Mineralwasser (IDM) (Ed.). (2005a). *Richtig trinken im Sport - Ein Leitfaden für Sportlehrer und Trainer* [Adequate fluid intake during sport and physical exercise - A guideline for physical education teachers and coaches]. Bonn, Germany: Editor.

Informationszentrale Deutsches Mineralwasser (IDM) (Ed.). (2005b). *Mehr trinken -*

besser denken [Drinking more - thinking better]. Bonn, Germany: Editor.

Informationszentrale Deutsches Mineralwasser (IDM) (Ed.). (2005c). *Wasser ist nicht gleich Wasser* [Water and water are not the same]. Bonn, Germany: Editor.

Informationszentrale Deutsches Mineralwasser (IDM). (2005d). *Pro-Kopf-Verbrauch von Mineral- und Heilwasser* [Per-capita consumption of mineral water and water for medicinal purposes]. Retrieved March 20, 2006, from http://www.mineralwasser.com/cms/startordner/1300_a4970u4954v4238w4236.html

Inman, J. J. (2001). The role of sensory-specific satiety in attribute-level variety seeking. *Journal of Consumer Research, 28,* 105-120.

Iskandarani, M., & Webb, P. (2000). Trinkwasserknappheit: Ein sich verschärfendes Nahrungsproblem [Shortage of drinking water: An increasing nutritional problem]. In Deutsche Welthungerhilfe (Ed.), *Jahrbuch Welternährung* (pp. 68-71). Frankfurt a.M., Germany: Fischer Taschenbuch.

Jackson, C., Lawton, R., Knapp, P., Raynor, D. K., Conner, M., Lowe, C., et al. (2005). Beyond intention: Do specific plans increase health behaviours in patients in primary care? A study of fruit and vegetable consumption. *Social Science & Medicine, 60,* 2383-2391.

Jackson, D. L. (2003). Revisiting sample size and number of parameter estimates: Some support for the N:q hypothesis. *Structural Equation Modeling, 10,* 128-141.

Jansen, E., Mulkens, S., Emond, Y., & Jansen, A. (2008). From the Garden of Eden to the land of plenty - Restriction of fruit and sweets intake leads to increased fruit and sweets consumption in children. *Appetite, 51,* 570-575.

Jansen, E., Mulkens, S., & Jansen, A. (2007). Do not eat the red food!: Prohibition of snacks leads to their relatively higher consumption in children. *Appetite, 49,* 572-577.

Jary, D., & Jary, J. (Eds.). (2000). *Collins dictionary of sociology.* Glasgow, UK: HarperCollins.

Kaiser, F. G., & Gutscher, H. (2003). The proposition of a general version of the theory of planned behavior: Predicting ecological behavior. *Journal of Applied Social Psychology, 33,* 586-603.

Kamensky, J. (1995). Essen und Ernähren mit Sozialhilfe - ein Bericht aus der Praxis [Eating and nourishing while being on welfare - A report from real life]. In E. Barlösius, E. Feichtinger, & B. M. Köhler (Eds.), *Ernähung in der Armut* (pp. 237-253). Berlin, Germany: Edition Sigma.

Kamensky, J., Feichtinger, E., & Zenz, H. (2000). Essen und Einkommen [Eating and income]. In Deutsche Gesellschaft für Ernährung (Ed.), *Lebensmittel - Mittel zum Leben* (pp. 29-47). Jena, Germany: Editor.

Karmasin, H. (1999). *Die geheime Botschaft unserer Speisen* [The hidden message in our foods]. München, Germany: Kunstmann.

Kassem, N. O., & Lee, J. W. (2004). Understanding soft drink consumption among male adolescents using the theory of planned behavior. *Journal of Behavioral Medicine, 27,* 273-296.

Katschinski, M. (2002). Regulation von Appetit und Sättigung [Regulation of appetite and satiety]. *Aktuelle Ernährungsmedizin, 27,* 375-380.

Kaur, P., & Singh, R. (2006). Children in family purchase decision making in India and the west: A review. *Academy of Marketing Science Review, 2006(8),* 1-30. Retrieved August 18, 2006, from http://www.amsreview.org/articles/kaur08-2006.pdf

Keller, M. C., Fredrickson, B. L., Ybarra, O., Côté, S., Johnson, K., Mikels, J., et al. (2005). A warm heart and a clear head - The contingent effects of weather on mood and cognition. *Psychological Science, 16,* 724-731.

King, S. C., Meiselman, H. L., Hottenstein, A. W., Work, T. M., & Cronk, V. (2007). The effects of contextual variables on food acceptability: A confirmatory study. *Food Quality and Preference, 18,* 58-65.

Kish, G. B., & Donnenwerth, G. V. (1972). Sex differences in the correlates of stimulus seeking. *Journal of Consulting and Clinical Psychology, 38,* 42-49.

Klocke, A. (1995). Der Einfluß sozialer Ungleichheit auf das Ernährungsverhalten im Kindes- und Jugendalter [The influence of social inequality on nutrition behavior during childhood and adolescence]. In E. Barlösius, E. Feichtinger, & B. M. Köhler (Eds.), *Ernährung in der Armut* (pp. 185-203). Berlin, Germany: Edition Sigma.

Klotter, C. (2007). *Einführung Ernährungspsychologie* [Psychology of nutrition: Introduction]. München, Germany: Reinhardt.

Knaapila, A., Tuorila, H., Silventoinen, K., Keskitalo, K., Kallela, M., Wessman, M., et al. (2007). Food neophobia shows heritable variation in humans. *Physiology and Behavior, 91,* 573-578.

Knibbe, R. A., Oostveen, T., & van de Goor, I. (1991). Young people's alcohol consumption in public drinking places: Reasoned behaviour or related to the situation? *British Journal of Addiction, 86,* 1425-1433.

Knoblich, H., Scharf, A., & Schubert, B. (Eds.). (1996). *Geschmacksforschung* [Research into taste]. München, Germany: Oldenbourg.

Köhler, B. M. (1995). Ernährung in der Armut - Folgen für die Gesundheit [Nutrition under conditions of poverty - Health-related consequences]. In E. Barlösius, E. Feichtinger, & B. M. Köhler (Eds.), *Ernährung in der Armut* (pp. 271-290). Berlin, Germany: Edition Sigma.

Köhler, B. M., Feichtinger, E., Barlösius, E., & Dowler, E. (Eds.). (1997). *Poverty and food in welfare societies.* Berlin, Germany: Edition Sigma.

Köster, E. P. (2003). The psychology of food choice: Some often encountered fallacies. *Food Quality and Preference, 14,* 359-373.

Köster, E. P. (2009). Diversity in the determinants of food choice: A psychological perspective. *Food Quality and Preference, 20,* 70-82.

Kohlmeier, L., Kroke, A., Pötzsch, J., Kohlmeier, M., & Martin, K. (1993). *Ernährungsabhängige Krankheiten und ihre Kosten* [Nutrition-dependent diseases and their costs]. Baden-Baden, Germany: Nomos.

Koivisto, U.-K., & Sjödén, P.-O. (1996). Food and general neophobia in Swedish families: Parent-child comparisons and relationships with serving specific foods. *Appetite, 26,* 107-118.

Koivisto Hursti, U.-K., & Sjödén, P.-O. (1997). Food and general neophobia and their relationship with self-reported food choice: Familial resemblance in Swedish families with children of ages 7-17 years. *Appetite, 29,* 89-103.

Koletzko, B. (2005). Was macht Kinder dick? [Causes and consequences of overweight in children]. *Ernährungs-Umschau, 52,* 94-98.

Krems, C., Bauch, A., Götz, A., Heuer, T., Hild, A., Möseneder, J., et al. (2006). Methoden der Nationalen Verzehrsstudie II [Methods of the National Nutrition Survey II]. *Ernährungs-Umschau, 53,* 44-51.

Kroeze, J. H. A. (1990). The perception of complex taste stimuli. In R. L. McBride & H. J. H. MacFie (Eds.), *Psychological basis of sensory evaluation* (pp. 41-68). London: Elsevier.

Kroke, A., & Günther, A. L. B. (2006). Mangel im Überfluss - Ernährungsepidemiologische Daten zu Übergewicht und Nährstoffmangel [Deficiency in affluence - Epidemiological data on the relation between overweight and nutrient deficiency]. *Ernährungs-Umschau, 53,* 480-485.

Kübler, W., Hüppe, R., Matiaske, B., Rosenbauer, J., & Anders, H.-J. (1990). Was verzehrt der Bundesbürger? - Was sind die Folgen? [What does a citizen of West Germany eat? - What are the consequences?]. *Ernährungs-Umschau, 37,* 102-107.

Kutsch, T. (Ed.). (1993). *Ernährungsforschung - interdisziplinär* [Interdisciplinary research on nutrition]. Darmstadt, Germany: Wissenschaftliche Buchgesellschaft.

Kutsch, T. (2000). Ernährung und Gesellschaft [Nutrition and society]. In Deutsche Gesellschaft für Ernährung (Ed.), *Lebensmittel - Mittel zum Leben* (pp. 9-28). Jena, Germany: Editor.

Kvaavik, E., Lien, N., Tell, G. S., & Klepp, K.-I. (2005). Psychosocial predictors of eating habits among adults in their mid-30s: The Oslo Youth Study follow-up 1991-1999. *International Journal of Behavioral Nutrition and Physical Activity, 2.* Retrieved May 18, 2007, from http://www.ijbnpa.org/content/2/1/9

Lähteenmäki, L., & Tuorila, H. (1995). Three-factor eating questionnaire and the use and liking of sweet and fat among dieters. *Physiology and Behavior, 57,* 81-88.

Lähteenmäki, L., & Tuorila, H. (1998). Predicting the intention to use juice or milk in three contexts. *Food Quality and Preference, 9,* 231-236.

Lähteenmäki, L., & van Trijp, J. C. M. (1995). Hedonic responses, variety-seeking tendency and expressed variety in sandwich choices. *Appetite, 24,* 139-152.

Langhans, W. (2002). Zentrale Regulation der Nahrungsaufnahme [Central control of food intake]. *Aktuelle Ernährungsmedizin, 27,* 381-388.

Langnäse, K., Mast, M., & Müller, M. J. (1999). Sozioökonomischer Einfluss auf Gesundheit und Ernährung [Socio-economic influence on health and nutrition]. *Ernährungs-Umschau, 46,* 370-376.

Langnäse, K., Mast, M., & Müller, M. J. (2000). Sozialer Status, Ernährung und Gesundheit [Social status, nutrition and health]. *Aktuelle Ernährungsmedizin, 25,* 16-19.

Laroche, M. (1978). Four methodological problems in multi-attribute attitude models. *Advances in Consumer Research, 5,* 175-179.

Last, J. M. (2001). *A dictionary of epidemiology.* Oxford, UK: Oxford University Press.

Laurioux, B. (1999). *Tafelfreuden im Mittelalter* [Culinary delights in mediaeval times]. Augsburg, Germany: Weltbild.

Lautenschlager, L., & Smith, C. (2007). Understanding gardening and dietary habits among youth garden program participants using the theory of planned behavior. *Appetite, 49,* 122-130.

Laux, L. (2003). *Persönlichkeitspsychologie* [The psychology of personality]. Stuttgart, Germany: Kohlhammer.

Lauzon, B. de, Romon, M., Deschamps, V., Lafay, L., Borys, J.-M., Karlsson, J., et al. (2004). The Three-Factor Eating Questionnaire-R18 is able to distinguish among different eating patterns in a general population. *The Journal of Nutrition, 134,* 2372-2380. Retrieved June 12, 2006, from http://jn.nutrition.org/cgi/reprint/134/9/2372

Lee, H.-C., Tsai, S.-Y., & Lin, H.-C. (2007). Seasonal variations in bipolar disorder admissions and the association with climate: A population-based study. *Journal* *of Affective Disorders, 97,* 61-69.

Legg, C., Puri, A., & Thomas, N. (2000). Dietary restraint and self-reported meal sizes: Diary studies with differentially informed consent. *Appetite, 34,* 235-243.

Lehmkühler, S., & Leonhäuser, I.-U. (2000, March). *Armutsprävention durch Stärkung von Ernährungskompetenzen* [Poverty prevention through encouragement of nutrition competences] [Abstract and poster]. *Proceedings of the German Nutrition Society, 2,* 31.

Lehnert, H. (2006). Mögliche Ursachen und Konsequenzen einer Süßpräferenz beim Menschen [Possible causes and sequelae of a sweet preference in humans]. *Aktuelle Ernährungsmedizin, 31*(Suppl.1), 13-16.

Lehrke, S., Hubel, R., & Laessle, R. G. (2005). Essverhalten und psychosoziale Belastung von Personen mit hoher und niedriger wahrgenommener Diäthäufigkeit [Eating behavior and psychosocial strain of persons with high and low perceived frequency of dieting]. *Zeitschrift für Gesundheitspsychologie, 13,* 21-28.

Lei, M., & Lomax, R. G. (2005). The effect of varying degrees of nonnormality in structural equation modeling. *Structural Equation Modeling, 12,* 1-27.

Leitzmann, C., & Cannon, G. (2006). Die Gießener Erklärung zum Projekt "Die neue Ernährungswissenschaft" [The Giessen Declaration: The new nutrition science project]. *Ernährungs-Umschau, 53,* 40-43.

Leitzmann, C., & Dauer, U. (1996). *Dictionary of nutrition.* Stuttgart, Germany: Ulmer.

Lemmens, P., Knibbe, R. A., & Tan, F. (1988). Weekly recall and diary estimates of alcohol consumption in a general population survey. *Journal of Studies on Alcohol, 49,* 131-135.

Lemmens, P., Tan, E. S., & Knibbe, R. A. (1992). Measuring quantity and frequency of drinking in a general population survey: A comparison of five indices. *Journal of Studies on Alcohol, 53,* 476-486.

Lenz, P. (2002). Trinkwasser - Mineralwasser - Tafelwasser: nicht nur lebensmittelrechtliche Unterschiede [Drinking water - mineral water - table water: not only legal differences]. In Deutsche Gesellschaft für Ernährung (DGE) (Ed.), *Wie gut* *ist unser Wasser?* (pp. 11-18). Schorndorf, Germany: Editor.

Levallois, P., Guévin, N., Gingras, S., Lévesque, B., Weber, J.-P., & Letarte, R. (1998). New patterns of drinking-water consumption: Results of a pilot study. *The Science of the Total Environment, 209,* 233-241.

Levine, A. S., & Billington, C. J. (1997). Why do we eat? A neural systems approach. *Annual Review of Nutrition, 17,* 597-619.

Libuda, L., Alexy, U., & Kersting, M. (2006). Verzehrsmengen gesüßter Getränke bei Kindern und Jugendlichen - Ergebnisse der DONALD Studie [Volumes of consumption of sweetened beverages in children and adolescents - Results from the DONALD study] [Abstract]. *Proceedings of the German Nutrition Society, 8,* 55.

Lienert, G. A. (1989). *Testaufbau und Testanalyse* [Construction and analysis of tests]. München, Germany: PVU.

Lind, B. (1997). *Zur Bedeutung gesundheitsbezogener Überzeugungen für das Ernährungsverhalten* [On the relevance of health related beliefs for nutrition behavior]. Unpublished master's thesis, University of Hamburg, Germany.

Linseisen, J., & Wolfram, G. (1995). Ernährungswissenschaftliche Untersuchungsergebnisse [Nutrition-scientific survey results]. In Techniker Krankenkasse (Ed.), *Wasser tut Not - Trinkverhalten in Bayern* (pp. 13-20). München, Germany: Editor.

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling, 9,* 151-173.

Loehlin, J. C. (2004). *Latent variable models.* Mahwah, NJ: Erlbaum.

Logue, A. W. (1995). *Die Psychologie des Essens und Trinkens* [The psychology of eating and drinking]. Heidelberg, Germany: Spektrum.

Logue, A. W. (2004). *The psychology of eating and drinking* (3rd ed.). New York: Brunner-Routledge.

Logue, A. W., & Smith, M. E. (1986). Predictors of food preferences in adult humans. *Appetite, 7,* 109-125.

Louis, W., Davies, S., Smith, J., & Terry, D. (2007). Pizza and pop and the student identity: The role of referent group norms in healthy and unhealthy eating. *The Journal of Social Psychology, 147,* 57-74.

Lowe, R., Eves, F., & Carroll, D. (2002). The influence of affective and instrumental beliefs on exercise intentions and behavior: A longitudinal analysis. *Journal of Applied Social Psychology, 32,* 1241-1252.

Lührmann, P., Krems, C., Frank, C., Herbert, B., Sültemeier, A., Hartmann, B., et al. (2001). Wasserzufuhr von älteren und jüngeren Personen im Vergleich [Comparing water intake of older and younger individuals] [Abstract]. *Proceedings of the German Nutrition Society, 3,* 4.

Macbeth, H. (Ed.). (1997). *Food preferences and taste.* Providence, RI: Berghahn.

Macht, M. (2005a). Essen und Emotion [Eating and emotions]. *Ernährungs-Umschau, 52,* 304-308.

Macht, M. (2005b). Emotionsbedingtes Essverhalten: Die Bedeutung der Emotionen [Emotion-dependent nutrition behavior: The relevance of emotions]. *Zeitschrift für Psychologie, 213,* 9-22.

Madhavan, P., & Lacson, F. C. (2006). Psychological factors affecting pilots' decisions to navigate in deteriorating weather. *North American Journal of Psychology, 8,* 47-62.

Manary, M. J., & Solomons, N. W. (2004). Public health aspects of undernutrition. In M. J. Gibney, B. M. Margetts, J. M. Kearney, & L. Arab (Eds.), *Public health nutrition* (pp. 178-191). Oxford, UK: Blackwell Science.

Margetts, B. M. (2004). Public health nutrition strategies for intervention at the individual level. In M. J. Gibney, B. M. Margetts, J. M. Kearney, & L. Arab (Eds.), *Public health nutrition* (pp. 120-132). Oxford, UK: Blackwell Science.

Marshall, D. (Ed.). (1995a). *Food choice and the consumer.* London: Blackie Academic.

Marshall, D. (1995b). Introduction: Food choice, the food consumer and food provisioning. In D. Marshall (Ed.), *Food choice and the consumer* (pp. 3-17). London: Blackie Academic.

Martens, H., & Næs, T. (1989). *Multivariate calibration.* Chichester, UK: Wiley.

Martin, J. J., Kulinna, P. H., McCaughtry, N., Cothran, D., Dake, J., & Fahoome, G. (2005). The theory of planned behavior: Predicting physical activity and cardio-respiratory fitness in African American children. *Journal of Sport and Exercise Psychology, 27,* 456-469.

Martín, A. R., Nieto, J. M. M., Ruiz, J. P. N., & Jiménez, L. E. (2008). Overweight and obesity: The role of education, employment and income in Spanish adults. *Appetite, 51,* 266-272.

Martin, J. J., Oliver, K. L., & McCaughtry, N. (2007). The theory of planned behavior: Predicting physical activity in Mexican American children. *Journal of Sport and Exercise Psychology, 29,* 225-238.

Martins, Y., Pelchat, M. L., & Pliner, P. (1997). "Try it; it's good and it's good for you": Effects of taste and nutrition information on willingness to try novel foods. *Appetite, 28,* 89-102.

Max Rubner-Institut (2008). *Ergebnisse NVS II - Basisauswertung II - Lebensmittelverzehr* [Results of the NVS II - Basic analyses II - Food intake]. Retrieved August 24, 2008, from http://www.was-esse-ich.de/uploads/media/PK-29-5-Schwerpunkt_Lebensmittelverzehr.pdf

McAlister, L., & Pessemier, E. (1982). Variety seeking behavior: An interdisciplinary review. *Journal of Consumer Research, 9,* 311-322.

McBride, R. L., & Anderson, N. H. (1990). Integration psychophysics. In R. L. McBride & H. J. H. MacFie (Eds.), *Psychological basis of sensory evaluation* (pp. 93-115). London: Elsevier.

McBride, R. L., & MacFie, H. J. H. (Eds.). (1990). *Psychological basis of sensory evaluation.* London: Elsevier.

McCarron, A., & Tierney, K. J. (1989). The effect of auditory stimulation on the consumption of soft drinks. *Appetite, 13,* 155-159.

McEwan, J. A., & Colwill, J. S. (1996). The sensory assessment of the thirst-quenching characteristics of drinks. *Food Quality and Preference, 7,* 101-111.

McFarlane, T., & Pliner, P. (1997). Increasing willingness to taste novel foods: Effects of nutrition and taste information. *Appetite, 28,* 227-238.

McLean, J. A., Barr, S. I. & Prior, J. C. (2001). Cognitive dietary restraint is associated with higher urinary cortisol excretion in healthy premenopausal women. *American Journal of Clinical Nutrition, 73,* 7-12.

Mehrabian, A. (1987). *Eating characteristics and temperament.* New York: Springer.

Meiselman, H. L. (2006). The role of context in food choice, food acceptance and food consumption. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 179-199). Wallingford, UK: CABI.

Meiselman, H. L., Hedderley, D., Staddon, S. L., Pierson, B. J., & Symonds, C. R. (1994). Effect of effort on meal selection and meal acceptability in a student cafeteria. *Appetite, 23,* 43-55.

Meiselman, H. L., Johnson, J. L., Reeve, W., & Crouch, J. E. (2000). Demonstrations of the influence of the eating environment on food acceptance. *Appetite, 35,* 231-237.

Meiselman, H. L., Mastroianni, G., Buller, M., & Edwards, J. (1999). Longitudinal measurement of three eating behavior scales during a period of change. *Food Quality and Preference, 10,* 1-8.

Mela, D. J. (1999). Food choice and intake: The human factor. *Proceedings of the Nutrition Society, 58,* 513-521.

Mennella, J. A., & Beauchamp, G. K. (1996). The early development of human flavor preferences. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 83-112). Washington, DC: American Psychological Association.

Mensink, G. B. M., Thamm, M., & Haas, K. (1999). Die Ernährung in Deutschland 1998 [Dietary intake in Germany 1998] [Special issue 2]. *Gesundheitswesen, 61,* 200-206.

Mensink, G., Beitz, R., Burger, M., & Bisson, S. (2000). Lebensmittelkonsum in Deutschland [Food intake in Germany]. *Ernährungs-Umschau, 47,* 328-332.

Mestdag, I. (2005). Disappearance of the traditional meal: Temporal, social and spatial destructuration. *Appetite, 45,* 62-74.

Meyer, S. (2002). *Mahlzeitenmuster in Deutschland* [Meal patterns in Germany]. München, Germany: Herbert Utz.

Miles, J. (2001). *Research methods and statistics.* Exeter, UK: Crucial.

Miles, J., & Shevlin, M. (2001). *Applying regression and correlation.* London: Sage.

Mineral- und Tafelwasserverordnung (2005). [Mineral and table water regulation]. Retrieved March 20, 2006, from http://www.mineralwasser.com/cms/files/mw_MTV-0905.pdf

Mischel, W. (1968). *Personality and assessment.* New York: Wiley.

Montanari, M. (1999). *Der Hunger und der Überfluß* [Hunger and abundance]. München, Germany: Beck.

Moreira, P., de Almeida, M. D. V., & Sampaio, D. (2005). Cognitive restraint is associated with higher intake of vegetables in a sample of university students. *Eating Behaviors, 6,* 229-237.

Müller, M. J., Danielzik, S., Pust, S., & Landsberg, B. (2006). Sozioökonomische Einflüsse auf Gesundheit und Übergewicht [Socioeconomic gradients in health and overweight]. *Ernährungs-Umschau, 53,* 212-217.

Nachtigall, C., Kroehne, U., Funke, F., & Steyer, R. (2003). (Why) Should we use SEM? Pros and cons of structural equation modeling. *Methods of Psychological Research - Online, 8(2),* 1-22. Retrieved May 19, 2005, from http://www.mpr-online.de/issue20/art1/mpr127_11.pdf

Naumann, A., & Rau, G. (1996). *Untersuchung zu Veränderungen des Eßverhaltens im Zusammenhang mit einem Auslandsaufenthalt* [Investigation into changes of eating behavior while staying abroad] Unpublished master's thesis, University of Hamburg, Germany.

Nejad, L. M., Wertheim, E. H., & Greenwood, K. M. (2004). Predicting dieting behavior by using, modifying, and extending the theory of planned behavior. *Journal of Applied Social Psychology, 34,* 2099-2131.

Nelson, M., Beresford, S. A. A., & Kearney, J. M. (2004). Nutritional epidemiology. In M. J. Gibney, B. M. Margetts, J. M. Kearney, & L. Arab (Eds.), *Public health nutrition* (pp. 26-65). Oxford, UK: Blackwell Science.

Nestlé Deutschland AG (Ed.). (1999). *Gut essen - gesund leben* [Eating well - living healthy]. Frankfurt a.M., Germany: Editor.

Nicklaus, S. (2009). Development of food variety in children. *Appetite, 52,* 253-255.

Nicklaus, S., Boggio, V., Chabanet, C., & Issanchou, S. (2005). A prospective study of food variety seeking in childhood, adolescence and early adult life. *Appetite, 44,* 289-297.

Norman, P., & Conner, M. (2005). The theory of planned behavior and exercise: Evidence for the mediating and moderating roles of planning on intention-behavior relationships. *Journal of Sport and Exercise Psychology, 27,* 488-504.

Norman, P., & Conner, M. (2006). The theory of planned behaviour and binge drinking: Assessing the moderating role of past behaviour within the theory of planned behaviour. *British Journal of Health Psychology, 11,* 55-70.

O'Callaghan, F. V., Chant, D. C., Callan, V. J., & Baglioni, A. (1997). Models of alcohol use by young adults: An examination of various attitude-behavior theories. *Journal of Studies on Alcohol, 58,* 502-507.

Ogden, J. (2003). *The psychology of eating.* Malden, MA: Blackwell.

Olsson, U. H., Foss, T., Troye, S. V., & Howell, R. D. (2000). The performance of ML, GLS, and WLS estimation in structural equation modeling under conditions of misspecification and nonnormality. *Structural Equation Modeling, 7,* 557-595.

Oltersdorf, U. (1995a). Differences in German consumer concerns over suggested health and food hazards. In E. Feichtinger & B. M. Köhler (Eds.), *Current research into eating practices* (pp. 171-173). Frankfurt a.M., Germany: Umschau.

Oltersdorf, U. (1995b). *Ernährungsepidemiologie* [Nutrition epidemiology]. Stuttgart, Germany: Ulmer.

Oltersdorf, U. (2000). Ernährungsepidemiologie [Nutrition epidemiology]. *Zeitschrift für Ernährungsökologie, 1,* 89-98.

Oltersdorf, U. (2002). "Mahlzeiten in Deutschland" - Zeit für's Essen, Zeit zum Essen ["Meals in Germany" - Time for a meal, time to eat]. *dge info, 12/2002,* 179-181.

Oltersdorf, U., & Weingärtner, L. (1996). *Handbuch der Welternährung* [Handbook of global nutrition]. Bonn, Germany: Dietz.

Oppenheim, A. N. (1992). *Questionnaire design, interviewing and attitude measurement.* London: Continuum.

Orth, B. (1985). Bedeutsamkeitsanalysen bilinearer Einstellungsmodelle [Analyses of meaningfulness of bilinear attitude models]. *Zeitschrift für Sozialpsychologie, 16,* 101-115.

Orth, B. (1987). Lineare und bilineare Modelle für verhältnis- und intervallskalierte Variablen [Linear and bilinear models for ratio and interval scaled variables]. *Psychologische Beiträge, 29,* 442-457.

Otis, L. A. (1984). Factors influencing the willingness to taste unusual foods. *Psychological Reports, 54,* 739-745.

Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin, 124,* 54-74.

Paczensky, G. v., & Dünnebier, A. (1999). *Kulturgeschichte des Essens und Trinkens* [Culture history of eating and drinking]. München, Germany: Orbis.

Pandya-Lorch, R., & Pinstrup-Andersen, P. (2000). Aussichten für die globale Ernährungssicherung im 21. Jahrhundert [Perspectives on the global nutrition maintenance in the 21st century]. In Deutsche Welthungerhilfe (Ed.), *Jahrbuch Welternährung* (pp. 19-33). Frankfurt a.M., Germany: Fischer Taschenbuch.

Parker, P. M., & Tavassoli, N. T. (2000). Homeostasis and consumer behavior across cultures. *International Journal of Research in Marketing, 17,* 33-53.

Parmenter, K., & Wardle, J. (1999). Development of a general nutrition knowledge questionnaire for adults. *European Journal of Clinical Nutrition, 53,* 298-308.

Passe, D. H., Horn, M., & Murray, R. (2000). Impact of beverage acceptability on fluid intake during exercise. *Appetite, 35,* 219-229.

Patel, K. A., & Schlundt, D. G. (2001). Impact of moods and social context on eating behavior. *Appetite, 36,* 111-118.

Patterson, R. E., & Pietinen, P. (2004). Assessment of nutritional status in individuals and populations. In M. J. Gibney, B. M. Margetts, J. M. Kearney, & L. Arab (Eds.), *Public health nutrition* (pp. 66-82). Oxford, UK: Blackwell Science.

Pawlak, R., Brown, D., Meyer, M. K., Connell, C., Yadrick, K., Johnson, J. T., et al. (2008). Theory of planned behavior and multivitamin supplement use in caucasian college females. *The Journal of Primary Prevention, 29,* 57-71.

Pawlak, R., & Malinauskas, B. (2008). The use of the theory of planned behavior to assess predictors of intention to eat fruits among 9th-grade students attending two public high schools in Eastern North Carolina. *Family and Consumer Sciences Research Journal, 37,* 16-26.

Pawlik, K. (1978). Umwelt und Persönlichkeit: Zum Verhältnis von Ökologischer und Differentieller Psychologie [Environment and personality: On the relationship between ecological and differential psychology]. In C. F. Graumann (Ed.), *Ökologische Perspektiven in der Psychologie* (pp. 112-134). Bern, Switzerland: Huber.

Pawlik, K. (1982). Multivariate Persönlichkeitsforschung: Zur Einführung in Fragestellung und Methode [Multivariate research into personality: An introduction to the problem and the method]. In K. Pawlik (Ed.), *Multivariate Persönlichkeitsforschung* (pp. 17-54). Bern, Switzerland: Huber.

Pawlik, K. (1988). "Naturalistische" Daten für Psychodiagnostik: Zur Methodik psychodiagnostischer Felderhebungen ["Naturalistic" data for psychodiagnostics: On a methodology for psychodiagnostic field studies]. *Zeitschrift für Differentielle und Diagnostische Psychologie, 9,* 169-181.

Pawlik, K., & Buse, L. (1982). Rechnergestützte Verhaltensregistrierung im Feld: Beschreibung und erste psychometrische Überprüfung einer neuen Erhebungsmethode [Computer-based behavior registration in the field: Description and first psychometric evaluation of a new recording method]. *Zeitschrift für Differentielle und Diagnostische Psychologie, 3,* 101-118.

Pawlik, K., & Buse, L. (1994). "Psychometeorologie": Zeitreihenanalytische Ergebnisse zum Einfluß des Wetters auf die Psyche aus methodenkritischer Sicht ["Psychometeorology": A critical view of time-series analyses of the influence of the weather on the psyche]. *Psychologische Rundschau, 45,* 63-78.

Pawlik, K., & Buse, L. (1996). Verhaltensbeobachtung in Labor und Feld [Observation of behavior in laboratory and field settings]. In N. Birbaumer, D. Frey, J. Kuhl, W. Prinz, & F. E. Weinert (Eds.), *Enzyklopädie der Psychologie, Themen-*

bereich C, Serie VIII, Vol. 1. Grundlagen und Methoden der Differentiellen Psychologie (pp. 359-394). Göttingen, Germany: Hogrefe.

Pelchat, M. L., & Pliner, P. (1995). "Try it. You'll like it." Effects of information on willingness to try novel foods. *Appetite, 24,* 153-166.

Pervin, L. A. (2003). *The science of personality.* Oxford, UK: Oxford University Press.

Petit, C., & Sieffermann, J. M. (2007). Testing consumer preferences for iced-coffee: Does the drinking environment have any influence? *Food Quality and Preference, 18,* 161-172.

Pfau, C., & Piekarski, J. (2000). Art und Häufigkeit des Getränkekonsums in Haushalten älterer Menschen [The way and frequency of beverage consumption in households of the elderly] [Abstract and poster]. *Proceedings of the German Nutrition Society, 2,* 48.

Pliner, P., Bell, R., Hirsch, E. S., & Kinchla, M. (2006). Meal duration mediates the effect of "social facilitation" on eating in humans. *Appetite, 46,* 189-198.

Pliner, P., & Hobden, K. (1992). Development of a scale to measure the trait of food neophobia in humans. *Appetite, 19,* 105-120.

Pliner, P., & Pelchat, M. L. (1991). Neophobia in humans and the special status of foods of animal origin. *Appetite, 16,* 205-218.

Pliner, P., Pelchat, M., & Grabski, M. (1993). Reduction of neophobia in humans by exposure to novel foods. *Appetite, 20,* 111-123.

Pliner, P., & Salvy, S.-J. (2006). Food neophobia in humans. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 75-92). Wallingford, UK: CABI.

Plutchik, R., & Conte, H.R. (1989). Measuring emotions and their derivatives: Personality traits, ego defenses, and coping styles. In S. Wetzler & M.M. Katz (Eds.), *Contemporary approaches to psychological assessment* (pp. 239-269). New York: Brunner/Mazel.

Potts, H. W. W., & Wardle, J. (1998). The list heuristic for studying personality correlates of food choice behaviour: A review and results from two samples. *Appetite,* *30,* 79-92.

Prättälä, R. (1995). Social class and food in the nordic countries. In E. Feichtinger & B. M. Köhler (Eds.), *Current research into eating practices* (pp. 16-20). Frankfurt a.M., Germany: Umschau.

Prescott, J., Young, O., O'Neill, L., Yau, N. J. N., & Stevens, R. (2002). Motives for food choice: A comparison of consumers from Japan, Taiwan, Malaysia and New Zealand. *Food Quality and Preference, 13,* 489-495.

Projektträger "Forschung im Dienste der Gesundheit" (Ed.). (1992). *Die Nationale Verzehrsstudie* [The National Nutrition Survey]. Bonn, Germany: Editor.

Pudel, V. (1995, May). *Trends zum Ernährungsverhalten der Verbraucher* [Trends in consumers' nutrition behavior]. Paper presented at the general meeting of the Verband der Suppenindustrie e.V. Retrieved December 23, 1999, from http://www.suppeninstitut.de/TextPre6.htm

Pudel, V. (2000). Lebensmittel - psychologisch betrachtet [Psychological perspective on foods]. In Deutsche Gesellschaft für Ernährung (Ed.), *Lebensmittel - Mittel zum Leben* (pp. 105-111). Jena, Germany: Editor.

Pudel, V. (2001). Psychologie der Werbung: Warum kaufen wir was? [Advertising psychology: Why do we buy what we buy?]. In Deutsche Gesellschaft für Ernährung (Ed.), *Werbung und Ernährungsverhalten* (pp. 44-51). Schorndorf, Germany: Editor.

Pudel, V. (2002). *So macht Essen Spaß!* [Eating can be fun. I'll show you how!]. Weinheim, Germany: Beltz.

Pudel, V., & Westenhöfer, J. (1989). *Fragebogen zum Eßverhalten (FEV)* [German version of the Three-factor Eating Questionnaire (TFEQ)]. Göttingen, Germany: Hogrefe.

Pudel, V., & Westenhöfer, J. (2003). *Ernährungspsychologie* [Psychology of nutrition]. Göttingen, Germany: Hogrefe.

Raats, M., Daillant-Spinnler, B., Deliza, R., & MacFie, H. (1995). Are sensory properties relevant to consumer food choice? In D. Marshall (Ed.), *Food choice and the consumer* (pp. 239-263). London: Blackie Academic.

Raats, M. M., Shepherd, R., & Sparks, P. (1993). Attitudes, obligations and perceived control: Predicting milk selection. *Appetite, 20,* 239-241.

Rankinen, T., & Bouchard, C. (2006). Genetics of food intake and eating behavior phenotypes in humans. *Annual Review of Nutrition, 26,* 413-434.

Raudenbush, B., Corley, N., Flower, N. R., Kozlowski, A., & Meyer, B. (2003). Cephalic phase salivary response differences characterize level of food neophobia. *Appetite, 41,* 211-212.

Raudenbush, B., & Frank, R. A. (1999). Assessing food neophobia: The role of stimulus familiarity. *Appetite, 32,* 261-271.

Raudenbush, B., van der Klaauw, N. J., & Frank, R. A. (1995). The contribution of psychological and sensory factors to food preference patterns as measured by the Food Attitudes Survey (FAS). *Appetite, 25,* 1-15.

Reber, A. S. (1995). *The Penguin dictionary of psychology.* London: Penguin Books.

Reinecke, J. (2005). *Strukturgleichungsmodelle in den Sozialwissenschaften* [Structural equation models in the social sciences]. München, Germany: Oldenbourg.

Reinehr, T. (2005). Komorbidität und Therapie der Adipositas im Kindes- und Jugendalter aus medizinischer Sicht [Comorbidity and therapy of obesity in children and adolescents from the medical point of view]. *Ernährungs-Umschau, 52,* 354-358.

Reverdy, C., Chesnel, F., Schlich, P., Köster, E. P., & Lange, C. (2008). Effect of sensory education on willingness to taste novel food in children. *Appetite, 51,* 156-165.

Rhodes, R. E., Blanchard, C. M., Matheson, D. H., & Coble, J. (2006). Disentangling motivation, intention, and planning in the physical activity domain. *Psychology of Sport and Exercise, 7,* 15-27.

Rhodes, R. E., & Courneya, K. S. (2003). Investigating multiple components of attitude, subjective norm, and perceived control: An examination of the theory of planned behaviour in the exercise domain. *British Journal of Social Psychology, 42,* 129-146.

Rhodes, R. E., Courneya, K. S., & Jones, L. W. (2002). Personality, the theory of planned behavior, and exercise: A unique role for extroversion's [*sic*] activity facet. *Journal of Applied Social Psychology, 32,* 1721-1736.

Rhodes, R. E., Courneya, K. S., & Jones, L. W. (2004). Personality and social cognitive influences on exercise behavior: Adding the activity trait to the theory of planned behavior. *Psychology of Sport and Exercise, 5,* 243-254.

Richter, A., Vohmann, C., Stahl, A., Heseker, H., & Mensink, G. B. M. (2008). Der aktuelle Lebensmittelverzehr von Kindern und Jugendlichen in Deutschland [Present food intake by children and adolescents in Germany]. *Ernährungs-Umschau, 55,* 28-36.

Riepe, C. (2001). *Konstruktion eines änderungssensitiven State-Trait-Instruments zur Messung der Befindlichkeit - Eine explorative Feldstudie* [Development of a state-trait instrument for measuring mood changes - An exploratory field study]. Marburg, Germany: Tectum. [Microfiche]

Riepe, C. (2003). Variety Seeking bei der Auswahl von Lebensmittelprodukten [Variety seeking in food choice]. *Planung und Analyse, 30* (1), 41-47.

Riepe, C., & Lamprecht, G. (2001). Welche Mechanismen beeinflussen das Konsumverhalten im Lebensmittelbereich? [Which mechanisms influence consumption behavior in the food domain?]. *Planung und Analyse, 28* (4), 65-71.

Rind, B., & Strohmetz, D. (2001). Effect of beliefs about future weather conditions on restaurant tipping. *Journal of Applied Social Psychology, 31,* 2160-2164.

Ritchey, P. N., Frank, R. A., Hursti, U.-K., & Tuorila, H. (2003). Validation and cross-national comparison of the food neophobia scale (FNS) using confirmatory factor analysis. *Appetite, 40,* 163-173.

Robert Koch-Institut (RKI) (Ed.). (2002a). *Lebensmittelbedingte Erkrankungen in Deutschland* [Foodborne diseases in Germany]. Retrieved February 18, 2005, from http://www.rki.de/cln_011/nn_226040/DE/Content/GBE/Gesundheitsberichterstattung/GBEDownloadsT/lebensmittelbedingte__erkrankungen,templateId=raw,property=publicationFile.pdf/lebensmittelbedingte_erkrankungen

Robert Koch-Institut (RKI) (Ed.). (2002b). *Was essen wir heute? Ernährungsverhalten* *in Deutschland* [What shall we eat today? Nutrition behavior in Germany]. Berlin, Germany: Editor.

Robert Koch-Institut (RKI) (Ed.). (2004). *Messung und Quantifizierung soziographischer Merkmale in epidemiologischen Studien* [Measurement and quantification of socio-graphic characteristics in epidemiological surveys]. Retrieved May 12, 2005, from http://www.rki.de/cln_006/nn_225668/sid_28F69F4E090BEF58A30191F9A68DA149/DE/Content/GBE/EpidemiologischeMethoden/Empfehlungen/empfehlungen__pdf2.html__nnn=true

Robert Koch-Institut (RKI) (Ed.). (2005a). *Übergewicht und Adipositas* [Overweight and obesity]. Retrieved September 3, 2006, from http://www.rki.de/cln_011/nn_349116/DE/Content/GBE/Gesundheitsberichterstattung/GBEDownloadsT/uebergewicht,templateId=raw,property=publicationFile.pdf/uebergewicht

Robert Koch-Institut (RKI) (Ed.). (2005b). *Körperliche Aktivität* [Physical activity]. Retrieved September 26, 2006, from http://www.rki.de/cln_006/nn_226040/DE/Content/GBE/Gesundheitsberichterstattung/GBEDownloadsT/koerperliche__aktivitaet,templateId=raw,property=publicationFile.pdf/koerperliche_aktivitaet

Robert Koch-Institut (RKI) (Ed.). (2006). *Gesundheit in Deutschland* [Health in Germany]. Retrieved September 25, 2006, from http://www.rki.de/cln_011/nn_352008/DE/Content/GBE/Gesundheitsberichterstattung/GesInDtld/gesundheitsbericht,templateId=raw,property=publicationFile.pdf/gesundheitsbericht

Roininen, K., Lähteenmäki, L., & Tuorila, H. (1999). Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite, 33,* 71-88.

Rolls, B. J., Rolls, E. T., & Rowe, E. A. (1983). The influence of variety on human food selection and intake. In L. M. Barker (Ed.), *The psychobiology of human food selection* (pp. 101-122). Westport, CT: AVI Publishing Company.

Rolls, B. J., Fedoroff, I. C., Guthrie, J. F., & Laster, L. J. (1990). Effects of temperature and mode of presentation of juice on hunger, thirst and food intake in humans. *Appetite, 15,* 199-208.

Rolls, E. T. (1997). Neural processing underlying food selection. In H. Macbeth (Ed.), *Food preferences and taste* (pp. 39-53). Providence, RI: Berghahn.

Rosin, S., Tuorila, H., & Uutela, A. (1992). Garlic: A sensory pleasure or a social nuisance? *Appetite, 19,* 133-143.

Rozin, P. (1991). Family resemblance in food and other domains: The family paradox and the role of parental congruence. *Appetite, 16,* 93-102.

Rozin, P. (1996). Sociocultural influences on human food selection. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 233-263). Washington, DC: American Psychological Association.

Rozin, P. (2006). The integration of biological, social, cultural and psychological influences on food choice. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 19-39). Wallingford, UK: CABI.

Rozin, P., & Markwith, M. (1991). Cross-domain variety seeking in human food choice. *Appetite, 16,* 57-59.

Russell, C. G., & Worsley, A. (2008). A population-based study of preschoolers' food neophobia and its associations with food preferences. *Journal of Nutrition Education and Behavior, 40,* 11-19.

Rutter, D., & Quine, L. (Eds.). (2002a). *Changing health behaviour - Intervention and research with social cognition models.* Maidenhead, UK: Open University Press.

Rutter, D., & Quine, L. (2002b). Social cognition models and changing health behaviours. In D. Rutter & L. Quine (Eds.), *Changing health behaviour - Intervention and research with social cognition models* (pp. 1-27). Maidenhead, UK: Open University Press.

Saba, A., & Di Natale, R. (1999). A study on the mediating role of intention in the impact of habit and attitude on meat consumption. *Food Quality and Preference, 10,* 69-77.

Saba, A., Moneta, E., Nardo, N., & Sinesio, F. (1998). Attitudes, habit, sensory and liking expectation as determinants of the consumption of milk. *Food Quality and*

Preference, 9, 31-41.

Satow, L. (1996). *Psychologische Determinanten einer gesunden Ernährungsweise* [Psychological determinants of a healthy nutrition style]. Unpublished master's thesis, Freie Universität, Berlin, Germany.

Saurina, C., & Coenders, G. (2002). Predicting Overall Service Quality. A Structural Equation Modelling Approach. In A. Ferligoj & A. Mrvar (Eds.), *Developments in Social Science Methodology, Metodološki Zvezki 18* (pp. 217-238). Ljubljana, Slovenia: FDV. Retrieved January 15, 2008, from http://mrvar.fdv.uni-lj.si/pub/mz/mz18/coender2.pdf

Schafe, G. E., & Bernstein, I. L. (1996). Taste aversion learning. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 31-51). Washington, DC: American Psychological Association.

Schaninger, C. M. (1981). Social class versus income revisited: An empirical investigation. *Journal of Marketing Research, 18,* 192-208.

Scharf, A., & Fricke, J. (1998). Verknüpfung deskriptiver und affektiver Sensorikdaten mittels multivariater Kalibrierung [Linking descriptive and affective sensory data by means of multivariate calibration]. *Marktforschung und Management, 42,* 20-27.

Schek, A. (2000). Sportlergetränke - Anspruch und Wirklichkeit [Drinks for athletes - Claim and reality]. *Ernährungs-Umschau, 47,* 228-234.

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research - Online*, *8*(2), 23-74. Retrieved May 20, 2005, from http://www.mpr-online.de/issue20/art2/mpr130_13.pdf

Schickenberg, B., van Assema, P., Brug, J., & de Vries, N. (2006). Level of food neophobia in Dutch adults and association with familiarity with and willingness to try new healthful food products. *Appetite, 47,* 276.

Schifter, D. E., & Ajzen, I. (1985). Intention, perceived control, and weight loss: An application of the theory of planned behavior. *Journal of Personality and Social Psychology, 49,* 843-851.

Schmidt, F. L. (1973). Implications of a measurement problem for expectancy theory research. *Organizational Behavior and Human Performance, 10,* 243-251.

Schmidt-Rathjens, C. (2000). Ernährung [Nutrition]. In N. Birbaumer, D. Frey, J. Kuhl, W. Prinz, & W. Schneider (Eds.), *Enzyklopädie der Psychologie, Themenbereich C, Serie VIII, Vol. 4. Determinanten individueller Unterschiede* (pp. 205-247). Göttingen, Germany: Hogrefe.

Schneider, K., & Rheinberg, F. (1996). Erlebnissuche und Risikomotivation [Adventure seeking and risk motivation]. In N. Birbaumer, D. Frey, J. Kuhl, W. Prinz, & F. E. Weinert (Eds.), *Enzyklopädie der Psychologie, Themenbereich C, Serie VIII, Vol. 3. Temperaments- und Persönlichkeitsunterschiede* (pp. 407-439). Göttingen, Germany: Hogrefe.

Scholz, U., & Schwarzer, R. (2005). Modelle der Gesundheitsverhaltensänderung [Models of health behavior changes]. In N. Birbaumer, D. Frey, J. Kuhl, W. Schneider, & R. Schwarzer (Eds.), *Enzyklopädie der Psychologie, Themenbereich C, Serie X, Vol. 1. Gesundheitspsychologie* (pp. 389-405). Göttingen, Germany: Hogrefe.

Schubert, B., & Godersky, C. (1996). Entstehung von Geschmackspräferenzen [Development of taste preferences]. In H. Knoblich, A. Scharf, & B. Schubert (Eds.), *Geschmacksforschung* (pp. 89-129). München, Germany: Oldenbourg.

Schusdziarra, V., & Erdmann, J. (2006). Kohlenhydrate in der Regulation von Hunger und Sättigung [Carbohydrates and the regulation of hunger and satiety]. *Aktuelle Ernährungsmedizin, 31*(Suppl.1), 17-27.

Schumacker, R. E., & Lomax, R. G. (1996). *A beginner's guide to structural equation modeling.* Mahwah, NJ: Erlbaum.

Schwenk, M. (2002). Unerwünschte Stoffe in Trink- und Mineralwasser [Undesirable substances in drinking and mineral water]. In Deutsche Gesellschaft für Ernährung (DGE) (Ed.), *Wie gut ist unser Wasser?* (pp. 69-81). Schorndorf, Germany: Editor.

Schwenkmezger, P., Eid, M., & Hank, P. (2000). Sozioökonomischer Status und Qualität der Umgebung [Socioeconomic status and quality of the environment].

In N. Birbaumer, D. Frey, J. Kuhl, W. Prinz, & W. Schneider (Eds.), *Enzyklopädie der Psychologie, Themenbereich C, Serie VIII, Vol. 4. Determinanten individueller Unterschiede* (pp. 129-204). Göttingen, Germany: Hogrefe.

Schwerdtner, E. (2003). *Förderliche Verhaltensweisen zur Erhaltung eines gesunden Körpergewichtes* [Beneficial behaviors for maintaining a healthy body weight]. Unpublished master's thesis, University of Hamburg, Germany.

Seidell, J. C., & Visscher, T. L. S. (2004). Public health aspects of overnutrition. In M. J. Gibney, B. M. Margetts, J. M. Kearney, & L. Arab (Eds.), *Public health nutrition* (pp. 167-177). Oxford, UK: Blackwell Science.

Sell, K., Gedrich, K., Fischer, B., & Döring, A. (2003). Trends im Ernährungsverhalten in der Region Augsburg [Trends in food consumption in Augsburg and its environs]. *Ernährungs-Umschau, 50,* 208-213.

Shepherd, R. (1990). Attitudes and beliefs as determinants of food choice. In R. L. McBride & H. J. H. MacFie (Eds.), *Psychological basis of sensory evaluation* (pp. 141-161). London: Elsevier.

Shepherd, R. (1997). The psychology of food choice: The influence of attitudes and flavour perception. In F. A. Tomás-Barberán & R. J. Robins (Eds.), *Phytochemistry of fruit and vegetables* (pp. 157-172). Oxford, UK: Clarendon.

Shepherd, R. (1999). Social determinants of food choice. *Proceedings of the Nutrition Society, 58,* 807-812.

Shepherd, R. (2006). The use of the stages of change model with dietary behaviours. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 345-356). Wallingford, UK: CABI.

Shepherd, R., & Farleigh, C. A. (1986). Attitudes and personality related to salt intake. *Appetite, 7,* 343-354.

Shepherd, R., Farleigh, C. A. & Stockley, L. (1985). The role of attitudes and personality in food choice. In J. M. Diehl & C. Leitzmann (Eds.), *Measurement and determinants of food habits and food preferences: Report of an EC Workshop, Giessen, West-Germany, 1-4 May 1985* (Euro-Nut report; 7; pp. 219-230). Wageningen, The Netherlands: Stichting Nederlands Instituut voor de Voeding.

Shepherd, R., & Raats, M. (Eds.). (2006). *The psychology of food choice.* Wallingford, UK: CABI.

Shepherd, R., Sparks, P., Bellier, S., & Raats, M. M. (1991). Attitudes and choice of flavoured milks: Extensions of Fishbein and Ajzen's theory of reasoned action. *Food Quality and Preference, 3,* 157-164.

Sheppard, B. H., Hartwick, J., & Warshaw, P. R. (1988). The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research, 15,* 325-343.

Sichert, W., Oltersdorf, U., Winzen, U., & Leitzmann, C. (1984). Ernährungs-Erhebungs-Methoden [Methods for nutrition surveys]. *Ernährungs-Umschau, 31*(Suppl.), 1-88.

Simoons, F. J. (1983). Geography and genetics as factors in the psychobiology of human food selection. In L. M. Barker (Ed.), *The psychobiology of human food selection* (pp. 205-224). Westport, CT: AVI Publishing Company.

Sjöström, M., Ekelund, U., & Yngve, A. (2004). Assessment of physical activity. In M. J. Gibney, B. M. Margetts, J. M. Kearney, & L. Arab (Eds.), *Public health nutrition* (pp. 83-105). Oxford, UK: Blackwell Science.

Smith, C. F., Williamson, D. A., Bray, G. A., & Ryan, D. H. (1999). Flexible vs. rigid dieting strategies: Relationship with adverse behavioral outcomes. *Appetite, 32,* 295-305.

Smith, E. R., & Mackie, D. M. (2007). *Social psychology.* New York: Taylor & Francis.

Smith, J. L. (2002). *The psychology of food and eating.* Houndmills, Basingstoke, UK: Palgrave.

Sobal, J., Bisogni, C. A., Devine, C. M., & Jastran, M. (2006). A conceptual model of the food choice process over the life course. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 1-18). Wallingford, UK: CABI.

Sommer, R., & Steele, J. (1997). Social effects on duration in restaurants. *Appetite, 29,* 25-30.

Sonnenmoser, M. (1997). *Umweltbewußtes Einkaufen* [Going shopping the environmentally conscious way]. Landau, Germany: Verlag Empirische Pädagogik.

Sparks, P., Guthrie, C. A., & Shepherd, R. (1997). The dimensional structure of the perceived behavioral control construct. *Journal of Applied Social Psychology, 27,* 418-438.

Sparks, P., Hedderley, D., & Shepherd, R. (1992). An investigation into the relationship between perceived control, attitude variability and the consumption of two common foods. *European Journal of Social Psychology, 22,* 55-71.

Sparks, P., & Shepherd, R. (1992). Self-identity and the theory of planned behavior: Assessing the role of identification with "green consumerism". *Social Psychology Quarterly, 55,* 388-399.

Sparks, P., & Shepherd, R. (1994). Barriers to healthy eating: An examination of perceived behavioural control and unrealistic optimism. *Appetite, 23,* 290.

Sparks, P., Shepherd, R., Wieringa, N., & Zimmermanns, N. (1995). Perceived behavioural control, unrealistic optimism and dietary change: An exploratory study. *Appetite, 24,* 243-255.

Special Eurobarometer 238. (2006). *Risk issues - Executive summary on food safety.* Retrieved May 4, 2006, from http://www.efsa.eu.int/about_efsa/communicating_risk/risk_perception/1339/comm_summary_eurobarometer_en1.pdf

Spiekermann, U. (1996). Grundlagen der modernen Getränkekultur [Foundations of modern beverage culture]. *Aktuelle Ernährungsmedizin, 21,* 29-39.

Spiekermann, U. (2000). Forschungsaufgaben zur Erreichung der Ernährungsziele: Historischer Wandel der Ernährungsziele in Deutschland - Ein Überblick [Research objectives for attaining the nutritional goals: Historical change of the nutritional goals in Germany - An overview] [Abstract]. *22. Wissenschaftliche Jahrestagung der Arbeitsgemeinschaft Ernährungsverhalten e.V.* Bonn, Germany.

Spitzer, L., & Rodin, J. (1981). Human eating behavior: A critical review of studies in normal weight and overweight individuals. *Appetite, 2,* 293-329.

Stahl, A., & Heseker, H. (2006). Wasser [Water]. *Ernährungs-Umschau, 53,* 353-357.

Statistisches Bundesamt (Ed.). (2005). *Statistisches Jahrbuch 2005* [Statistical Yearbook 2005]. Wiesbaden, Germany: Editor.

Steenkamp, J.-B. E. M., & Baumgartner, H. (1992). The role of optimum stimulation level in exploratory consumer behavior. *Journal of Consumer Research, 19,* 434-448.

Steenkamp, J.-B. E. M., & van Trijp, H. C. M. (1991). The use of LISREL in validating marketing constructs. *International Journal of Research in Marketing, 8,* 283-299.

Steiger, J. H. (1995). Structural equation modeling. In Statsoft, Inc. (Ed.), *Statistica Addendum: New features in Statistica 5.0* (pp. 283-487). Tulsa, OK: Editor.

Stemmer, A. B. (1996). Aktuelle Getränkewelt - Was und wieviel trinken wir? [The current world of beverages - What and how much do we drink?]. In Deutsche Gesellschaft für Ernährung (DGE) (Ed.), *Was wir so alles trinken - Getränke in der Ernährung* (pp. 7-14). Kernen, Germany: Editor.

Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The Food Choice Questionnaire. *Appetite, 25,* 267-284.

Stiftung Warentest (Ed.). (2001). *Ernährung* [Nutrition]. München, Germany: Econ.

Stillman, J. A. (2002). Gustation: Intersensory experience par excellence. *Perception, 31,* 1491-1500.

Stone, A. A., Kessler, R. C., & Haythornthwaite, J. A. (1991). Measuring daily events and experiences: Decisions for the researcher. *Journal of Personality, 59,* 575-607.

Stroebe, W., Eagly, A. H., & Ajzen, I. (1996). Individuelle Unterschiede im Verhalten: Das sozialpsychologische Forschungsprogramm [Individual differences in behaviour: The social-psychological research programme]. In N. Birbaumer, D. Frey, J. Kuhl, W. Prinz, & F. E. Weinert (Eds.), *Enzyklopädie der Psychologie, Themenbereich C, Serie VIII, Vol. 1. Grundlagen und Methoden der Differentiellen Psychologie* (pp. 241-267). Göttingen, Germany: Hogrefe.

Stroebe, W., & Jonas, K. (2001). Health psychology: A social-psychological perspective. In M. Hewstone & W. Stroebe (Eds.), *Introduction to social psychology* (pp. 519-557). Malden, MA: Blackwell.

Stroebele, N., & de Castro, J. M. (2006). Listening to music while eating is related to increases in people's food intake and meal duration. *Appetite, 47,* 285-289.

Stubenitsky, K., & Mela, D. J. (2000). UK consumer perceptions of starchy foods. *British Journal of Nutrition, 83,* 277-285.

Stunkard, A. J., & Messick, S. (1985). The Three-Factor Eating Questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research, 29,* 71-83.

Sun, X., Guo, Y., Wang, S., & Sun, J. (2006). Predicting iron-fortified soy sauce consumption intention: Application of the theory of planned behavior and health belief model. *Journal of Nutrition Education and Behavior, 38,* 276-285.

Sutherland, S. (1995). *Dictionary of psychology.* Hants, UK: Macmillan Press.

Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing? *Journal of Applied Social Psychology, 28,* 1317-1338.

Sutton, S. (2002). Using social cognition models to develop health behaviour interventions: Problems and assumptions. In D. Rutter & L. Quine (Eds.), *Changing health behaviour - Intervention and research with social cognition models* (pp. 193-208). Maidenhead, UK: Open University Press.

Svensson, E. I., Sinervo, B., & Comendant, T. (2002). Mechanistic and experimental analysis of condition and reproduction in a polymorphic lizard. *Journal of Evolutionary Biology, 15,* 1034-1047.

Swanson, V., Power, K., Kaur, B., Carter, H., & Shepherd, K. (2006). The impact of knowledge and social influences on adolescents' breast-feeding beliefs and intentions. *Public Health Nutrition, 9,* 297-305.

Tabachnick, B. G., & Fidell, L. S. (Eds.). (2001). *Using multivariate statistics.* Boston, MA: Allyn and Bacon.

Techniker Krankenkasse (Ed.). (1993). *Ernährung* [Nutrition]. Hamburg, Germany: Editor.

Techniker Krankenkasse (Ed.). (1995). *Wasser tut Not - Trinkverhalten in Bayern*

[Water is essential - Drinking behavior in Bavaria]. München, Germany: Editor.

Tennen, H., Suls, J., & Affleck, G. (Eds.). (1991). Personality and daily experience [Special issue]. *Journal of Personality, 59*(3).

Tepper, B. J., Choi, Y.-S., & Nayga, R. M., Jr. (1997). Understanding food choice in adult men: Influence of nutrition knowledge, food beliefs and dietary restraint. *Food Quality and Preference, 8,* 307-317.

Terasaki, M., & Imada, S. (1988). Sensation seeking and food preferences. *Personality and Individual Differences, 9,* 87-93.

Terry, D. J., & O'Leary, J. E. (1995). The theory of planned behaviour: The effects of perceived behavioural control and self-efficacy. *British Journal of Social Psychology, 34,* 199-220.

Thøgersen, J. (1998). *Understanding behaviours with mixed motives. An application of a modified theory of reasoned action on consumer purchase of organic food products.* (Working paper 98-2; also: CeSaM Working Paper 1998:13). Århus, Denmark: The Aarhus School of Business, Faculty of Business Administration.

Timko, C. A., & Perone, J. (2005). Rigid and flexible control of eating behavior in a college population. *Eating Behaviors, 6,* 119-125.

Tippach-Schneider, S. (2004). *Das große Lexikon der DDR-Werbung* [The comprehensive dictionary of advertising in the GDR]. Berlin, Germany: Schwarzkopf und Schwarzkopf.

Tomiyama, A. J., Mann, T., & Comer, L. (2009). Triggers of eating in everyday life. *Appetite, 52,* 72-82.

Towler, G., & Shepherd, R. (1992). Application of Fishbein and Ajzen's expectancy-value model to understanding fat intake. *Appetite, 18,* 15-27.

Trinken im Sommer [Beverage intake in summer]. (1999, July). *dge info, 7/99,* 99-100.

Trinkwasserverordnung (2001). [Drinking water regulation]. Retrieved March 22, 2006, from http://www.dvgw.de/wasser/rechtsvorschriften/trinkwasserverordnung/1abschnitt.html

Tuorila, H. (1987). Selection of milks with varying fat contents and related overall liking, attitudes, norms and intentions. *Appetite, 8,* 1-14.

Tuorila, H., Andersson, Å., Martikainen, A., & Salovaara, H. (1998). Effect of product formula, information and consumer characteristics on the acceptance of a new snack food. *Food Quality and Preference, 9,* 313-320.

Tuorila, H., Lähteenmäki, L., Pohjalainen, L., & Lotti, L. (2001). Food neophobia among the Finns and related responses to familiar and unfamiliar foods. *Food Quality and Preference, 12,* 29-37.

Tuorila, H., Meiselman, H. L., Bell, R., Cardello, A. V., & Johnson, W. (1994). Role of sensory and cognitive information in the enhancement of certainty and liking for novel and familiar foods. *Appetite, 23,* 231-246.

Tuorila, H. M., Meiselman, H. L., Cardello, A. V., & Lesher, L. L. (1998). Effect of expectations and the definition of product category on the acceptance of unfamiliar foods. *Food Quality and Preference, 9,* 421-430.

Tuorila, M., Pangborn, R. M., & Schutz, H. G. (1990). Choosing a beverage: Comparison of preferences and beliefs related to the reported consumption of regular vs. diet sodas. *Appetite, 14,* 1-8.

Tuorila-Ollikainen, H., Lähteenmäki, L., & Salovaara, H. (1986). Attitudes, norms, intentions and hedonic responses in the selection of low salt bread in a longitudinal choice experiment. *Appetite, 7,* 127-139.

Turrell, G., Hewitt, B., Patterson, C., Oldenburg, B. & Gould, T. (2002). Socioeconomic differences in food purchasing behaviour and suggested implications for diet-related health promotion. *Journal of Human Nutrition & Dietetics, 15,* 355-364.

Tuschl, R. J., Laessle, R. G., Platte, P., & Pirke, K.-M. (1990). Differences in food-choice frequencies between restrained and unrestrained eaters. *Appetite, 14,* 9-13.

Tuu, H. H., Olsen, S. O., Thao, D. T., & Kim Anh, N. T. (2008). The role of norms in explaining attitudes, intention and consumption of a common food (fish) in Vietnam. *Appetite, 51,* 546-551.

Ullman, J. B. (2001). Structural equation modeling. In B. G. Tabachnick & L. S. Fidell (Eds.), *Using multivariate statistics* (pp. 653-771). Boston, MA: Allyn and Bacon.

Uttl, B., & Graf, P. (1997). Color-Word Stroop test performance across the adult life span. *Journal of Clinical and Experimental Neuropsychology, 19,* 405-420.

van den Bree, M. B. M., Przybeck, T. R., & Cloninger, C. R. (2006). Diet and personality: Associations in a population-based sample. *Appetite, 46,* 177-188.

van der Valk, M. J. M. (1999). *Sterker dan de verleiding van drank?* [Stronger than the temptation to drink?]. Unpublished master's thesis, Katholieke Universiteit Nijmegen, The Netherlands.

van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders, 5,* 295-315.

van Trijp, H. C. M., Hoyer, W. D., & Inman, J. J. (1996). Why switch? Product category-level explanations for true variety-seeking behavior. *Journal of Marketing Research, 33,* 281-292.

van Trijp, H. C. M., & Steenkamp, J.-B. E. M. (1992). Consumers' variety seeking tendency with respect to foods: Measurement and managerial implications. *European Review of Agricultural Economics, 19,* 181-195.

van Trijp, J. C. M. (1994). Product-related determinants of variety-seeking behavior for foods. *Appetite, 22,* 1-10.

van Trijp, J. C. M. (1995). *Variety-seeking in product choice behavior.* Unpublished doctoral dissertation, Landbouwuniversiteit Wageningen, The Netherlands.

van Trijp, J. C. M., Lähteenmäki, L., & Tuorila, H. (1992). Variety seeking in the consumption of spread and cheese. *Appetite, 18,* 155-164.

Verband Deutscher Mineralbrunnen. (n.d.). *Der Mineralwasser-Markt - Zahlen und Fakten 2004* [The mineral water market - Figures and facts 2004]. Retrieved March 20, 2006, from http://www.mineralwasser.com/cms/files/mw_Marktdaten2004.pdf

Verbeke, W., & Vackier, I. (2005). Individual determinants of fish consumption: Application of the theory of planned behaviour. *Appetite, 44,* 67-82.

Verbraucher-Zentrale NRW (Ed.). (2000). *Durstlöscher Wasser aus der Leitung oder Flasche?* [Thirst quenching water from the tap or bottle?]. Düsseldorf, Germany: Editor.

Vögele, C. (2005). Ernährung, Körpergewicht und Gewichtsregulation [Nutrition, body weight and its regulation]. In N. Birbaumer, D. Frey, J. Kuhl, W. Schneider, & R. Schwarzer (Eds.), *Enzyklopädie der Psychologie, Themenbereich C, Serie X, Vol. 1. Gesundheitspsychologie* (pp. 425-445). Göttingen, Germany: Hogrefe.

Wagner, G., Schröder, U., & Peil, J. M. (1996). Empfehlungen der Flüssigkeitszufuhr in Abhängigkeit von Alter, Geschlecht, Beruf und Lebenssituation [Recommendations for the intake of fluids depending on age, gender, profession and the individual's way of life]. *Aktuelle Ernährungsmedizin, 21,* 14-21.

Wagner-Rauh, S. (1995). Trinkverhalten in Bayern [Drinking behavior in Bavaria]. In Techniker Krankenkasse (Ed.), *Wasser tut Not - Trinkverhalten in Bayern* (pp. 9-12). München, Germany: Editor.

Wansink, B. (2004). Environmental factors that increase the food intake and consumption volume of unknowing consumers. *Annual Review of Nutrition, 24,* 455-479.

Wardle, J., Parmenter, K., & Waller, J. (2000). Nutrition knowledge and food intake. *Appetite, 34,* 269-275.

Watson, D., & Clark, L. A. (1994). Emotions, moods, traits, and temperaments: Conceptual distinctions and empirical findings. In P. Ekman & R. J. Davidson (Eds.), *The nature of emotion* (pp. 89-93). New York: Oxford University Press.

Watson, D., & Clark, L. A. (1997). Measurement and mismeasurement of mood: Recurrent and emergent issues. *Journal of Personality Assessment, 68,* 267-296.

Wentz, A., Boeing, H., Remer, T., & Manz, F. (2004). Flüssigkeitsversorgung von Teetrinkern und Nicht-Teetrinkern in Deutschland [Hydration status of tea and non-tea consumers]. *Aktuelle Ernährungsmedizin, 29,* 266-270.

Westenhöfer, J. (1991). Dietary restraint and disinhibition: Is restraint a homogeneous construct? *Appetite, 16,* 45-55.

Westenhöfer, J. (1996). *Gezügeltes Essen und Störbarkeit des Eßverhaltens* [Restrained eating and disturbance of eating behavior]. Göttingen, Germany: Hogrefe.

Westenhöfer, J., Stunkard, A. J., & Pudel, V. (1999). Validation of the flexible and rigid control dimensions of dietary restraint. *International Journal of Eating Disorders, 26,* 53-64.

Weyrauch, S. (1996). *Einfluß sozialökonomischer Merkmale auf den Lebensmittelverzehr und die Nährstoffzufuhr von Personen* [Influence of socioeconomic characteristics on food consumption and nutrient intake of individuals]. Unpublished doctoral dissertation, Technische Universität, München, Germany.

Wheeler, L., & Reis, H. T. (1991). Self-recording of everyday life events: Origins, types, and uses. *Journal of Personality, 59,* 339-354.

Williamson, D. A., Martin, C. K., York-Crowe, E., Anton, S. D., Redman, L. M.,

Winkler, G. (1992). *Validierung einer Food-Frequeny-Erhebung* [Validation of a food-frequency-survey]. Unpublished doctoral dissertation, Technische Universität, München, Germany.

Winkler, G. (1998). Ändern sich die Ernährungsgewohnheiten in Süddeutschland? [Is dietary intake changing in Southern Germany?]. *Ernährungs-Umschau, 45,* 388-391.

Wirtschaftsvereinigung Alkoholfreie Getränke (n.d.). *Entwicklung des Pro-Kopf-Verbrauchs von alkoholfreien Getränken nach Getränkearten 2000 - 2004* [Development of per-capita consumption of non-alcoholic beverages for different beverage types 2000 - 2004]. Retrieved March 29, 2006, from http://www.wafg-online.de/pdf/branche/proKopf.pdf

World Health Organization (WHO) (2003). *Obesity and overweight.* Retrieved February 17, 2006, from http://www.who.int/hpr/NPH/docs/gs_obesity.pdf

Worobey, J., Tepper, B. J., & Kanarek, R. B. (2006). *Nutrition and behavior.* Wallingford, UK: CABI Publishing.

Wüstefeld-Würfel, M. (1999). *Mineralwasser aus Konsumentensicht* [Consumers' view on mineral water]. Witterschlick/Bonn, Germany: Wehle.

Yaman, M. (2003). *Die Berücksichtigung der Robinsohnschen Curriculumdeterminanten bei der Behandlung des Themas Ernährung* [Consideration of Robinsohn's curricular determinant while teaching the subject nutrition]. Unpublished doctoral dissertation, University of Gießen, Germany.

Yeomans, M. R. (2006). The role of learning in development of food preferences. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp. 93-112). Wallingford, UK: CABI.

Zandstra, E. H., de Graaf, C., & van Trijp, H. C. M. (2000). Effects of variety and repeated in-home consumption on product acceptance. *Appetite, 35,* 113-119.

Zellner, D. A., & Durlach, P. (2002). What is refreshing? An investigation of the color and other sensory attributes of refreshing foods and beverages. *Appetite, 39,* 185-186.

Zuckerman, M. (1983). The distinction between trait and state scales is not arbitrary: Comment on Allen and Potkay's "On the arbitrary distinction between traits and states". *Journal of Personality and Social Psychology, 44,* 1083-1086.

Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking.* New York: Cambridge University Press.

APPENDIX A

Questionnaire Used in the Qualitative Elicitation Study

Universität Hamburg
Fachbereich Psychologie
Projekt: Dissertation von Carsten Riepe
WS 01/02

Vorbefragung

Datum : /___/___//___/___//___/___//   Interviewnummer : /___/___/___/

Ansprache der Tp:
Hallo, ich komme vom Fachbereich Psychologie. Wir machen dort eine wissenschaftliche Untersuchung zum Thema "Getränkekonsum im Alltag". Wären Sie bereit, mir dazu ein paar Fragen zu beantworten? Die Befragung dauert ca. 5 Minuten, alle Antworten werden anonym ausgewertet.

Wenn "ja", weiter mit V1:

V1 Sind Sie Student/in?

- Ja	1
- Nein	2 **-> ENDE**

V2a *Liste vorlegen!*
Hier habe ich eine Liste mit verschiedenen Getränkesorten. Welche dieser Getränkesorten nehmen Sie so im Laufe einer typischen Woche zu sich? Nennen Sie mir bitte alle Getränke, die auf Sie zutreffen.
Nachfragen:
Und welche anderen kalten oder warmen Getränke verwenden Sie auch noch?

V2b *Liste liegt weiter vor.*
Und gibt es auf dieser Liste Getränkebezeichnungen, mit denen Sie eigentlich gar nichts anfangen können, z.B. weil Sie sie hier zum ersten Mal lesen oder weil Sie sie zwar kennen, aber gar nicht so genau wissen, was das eigentlich ist?

	V2a	V2b
- Trinkmilch	1	1
- Milchgetränke	2	2
- Kaffee	3	3
- Malz- / Ersatzkaffee	4	4
- Schwarzer / grüner Tee	5	5
- Kräuter- / Früchtetee	6	6
- Mineralwasser	7	7
- Quellwasser	8	8
- Tafelwasser	9	9
- Heilwasser	10	10
- Leitungswasser	11	11
- Aromatisierte Wässer	12	12
- Limonaden / Brausen	13	13
- Kalorienverminderte Limonaden	14	14
- Bitter-Getränke	15	15
- Cola-Getränke	16	16
- Kalorienverminderte Cola-Getränke	17	17
- Cola-Mix Getränke	18	18
- Fruchtsaftgetränke	19	19
- Kalorienverminderte Fruchtsaftgetränke	20	20
- Fruchtsaftschorlen	21	21
- Fruchtsäfte	22	22
- Fruchtnektare	23	23
- Kalorienverminderte Fruchtnektare	24	24
- Energy Drinks	25	25
- Sportgetränke	26	26
- Eistee-Getränke	27	27
- Bier	28	28
- Alkoholfreies Bier	29	29
- Bier-Mischgetränke	30	30
- Sonstige alkoholische Mischgetränke	31	31
- Wein / Sekt	32	32
- Weinschorle	33	33
- Spirituosen	34	34
- andere Getränke, und zwar	35	35
(a) ______________________________		
(b) ______________________________		
(c) ______________________________		
(d) ______________________________		
- keine davon	36	36

V3 Jetzt möchte ich Ihnen gerne ein paar Fragen zum Konsum von Mineralwasser stellen. Zunächst einmal, wie häufig trinken Sie Mineralwasser?
Liste vorlegen!

- mehrmals täglich	1 -> V5
- ca. einmal am Tag	2 -> V5
- ca. 3 bis 6 mal in der Woche	3 -> V5
- ca. 1 bis 2 mal in der Woche	4 -> V5
- ca. 1 bis 3 mal im Monat	5 -> V5
- seltener als einmal im Monat	6 -> V5
- nie	7 -> **V4**

V4 Wie kommt es, daß Sie nie Mineralwasser trinken?
Nachfragen: Und gibt es noch andere Gründe?

____

____

____

____

____

____

Nach V4: ENDE des Interviews!

V5 Welche **Vorteile** sehen Sie darin, Mineralwasser zu trinken? Was ist gut daran?
Nachfragen: Und gibt es noch weitere Vorteile?

____

____

____

____

____

____

V6 Und welche **Nachteile** sehen Sie darin, Mineralwasser zu trinken? Was ist nicht so gut daran?
Nachfragen: Und gibt es noch weitere Nachteile?

____

____

____

____

____

____

V7 Gibt es einzelne Personen oder Institutionen, die es **begrüßen**, wenn Sie Mineralwasser trinken?
Nachfragen: Und gibt es noch weitere Personen oder Institutionen?

____

____

____

____

____

____

V8 Gibt es einzelne Personen oder Institutionen, die es **nicht begrüßen**, wenn Sie Mineralwasser trinken?
Nachfragen: Und gibt es noch weitere Personen oder Institutionen?

____

____

____

____

____

____

V9 Welche Umstände machen es Ihnen **leichter**, Mineralwasser zu trinken? Anders gefragt, unter welchen Bedingungen trinken Sie **häufiger oder mehr** Mineralwasser?
Nachfragen: Gibt es noch weitere erleichternde Bedingungen?

____

____

____

____

____

____

V10 Welche Umstände machen es Ihnen **schwerer**, Mineralwasser zu trinken? Anders gefragt, unter welchen Bedingungen trinken Sie **seltener oder weniger** Mineralwasser?
Nachfragen: Gibt es noch weitere erschwerende Bedingungen?

____

____

____

____

____

____

V11 Sagen Sie mir zum Schluß bitte noch, an welcher Hochschule Sie studieren.

- Uni Hamburg	1
- HWP	2
- FHS Hamburg	3
- TU Hamburg-Harburg	4
- Musikhochschule	5
- Kunsthochschule	6
- Uni der Bw Hamburg	7
- FHS der FHH	8
- andere, und zwar:	9

____

V12 Welches Hauptfach studieren Sie dort?

____

V13 Und im wievielten Fachsemester sind Sie jetzt im Wintersemester?

Im /___/___/. Semester

V14 Wie alt sind Sie?

Alter: /___/___/ Jahre

V15 Geschlecht eintragen:

- weiblich	1
- männlich	2

Vielen Dank für das Interview, Sie haben uns mit Ihren Angaben sehr geholfen!

APPENDIX B

Instruments Used in the Quantitative Main Study

B1 Premeasurement Questionnaire

(Questions V1 to V4, H1 to H38)

Universität Hamburg

Psychologisches Institut I - Projekt "Getränkekonsum im Alltag" - 2002

Datum: /____//____//____/ Uhrzeit: __________ Interviewnr. ____________

Liebe(r) Untersuchungsteilnehmer(in),
zunächst einmal vielen Dank dafür, daß Sie sich bereit erklärt haben, an einer wissenschaftlichen Untersuchung zum Thema "Getränkekonsum im Alltag" teilzunehmen! Dieses Projekt wird am Fachbereich Psychologie im Rahmen der Dissertation von Dipl.-Psych. Carsten Riepe durchgeführt und von Prof. Dr. Lothar Buse betreut.

Die Untersuchung läuft in drei Schritten ab:
1. Heute stellen wir Ihnen eine Menge Fragen und bitten Sie, jede einzelne davon sorgfältig zu beantworten und keine auszulassen! Außerdem erklären wir Ihnen, wie Sie 7 Tage lang mit Hilfe eines Trinktagebuchs Ihren persönlichen Getränkekonsum protokollieren sollen. Diese Voruntersuchung dauert ca. 90 Minuten.
2. Während der nächsten 7 Tage führen Sie dann das Trinktagebuch.
3. Anschließend bitten wir Sie, noch einmal zu einer Nachuntersuchung zu uns zu kommen. Diese Untersuchung wird ca. 30 Minuten dauern. Dabei erhalten Sie auch Ihr Teilnahmehonorar bzw. Ihre Vp-Stunden bescheinigt.

Aus organisatorischen Gründen bitten wir Sie, zunächst nur die Fragen auf dieser Seite zu beantworten!

Markieren Sie Ihre Antworten mit einem Kreis um die zugehörigen Ziffern!

V1	Sind Sie innerhalb der letzten 12 Monate schon einmal zum Thema "Getränkekonsum im Alltag" befragt worden oder haben Sie selbst andere zu diesem Thema befragt?	nein weiß nicht ja	1 2 # 3 #
V2a	Wieviele Personen, Sie selbst eingeschlossen, leben zur Zeit ständig in Ihrem Haushalt?	1 Person (d.h. ich alleine) mehr als 1 Person	1 2
V2b	Nur wenn "mehr als 1 Person": Wieviele Personen sind es genau?	bitte eintragen: ________ Personen	
V2c	Nur wenn "mehr als 1 Person": Und wieviele Personen in Ihrem Haushalt sind 14 Jahre alt oder älter?	bitte eintragen: ________ Personen	#
V3	Gibt es in Ihrem Haushalt einen Meßbecher o.ä., der Markierungen zum Abmessen von Flüssigkeiten hat?	nein weiß nicht ja	1 # 2 # 3
V4	Wenn Sie für Ihre Teilnahme an dieser Untersuchung ... a) ... als Psychologiestudent(in) Versuchspersonen-Stunden bescheinigt haben wollen, muß die Interviewnummer (oben rechts) mit einer 1 oder 2 beginnen. b) ... ein Honorar von EUR 26,-- erhalten möchten, muß die Interviewnummer (oben rechts) mit einer 3 oder 4 beginnen. Hat die Interviewnummer auf diesem Fragebogen aus Ihrer Sicht die richtige Anfangsziffer?	nein ja	1 # 2

Warten Sie, bis alle anderen Teilnehmer(innen) fertig sind. Blättern Sie noch nicht weiter!
Wenn Sie mindestens einmal eine mit # gekennzeichnete Antwort markiert haben, melden Sie sich bitte beim Untersuchungsleiter!

Gestern: Mo **1** Di **2** Mi **3** Do **4** Fr **5** Sa **6** So **7** **DATUM:** ________________ **Int.nr.** ______

1) Notieren Sie für jedes Zeitintervall, wieviel Sie GESTERN von welchen Getränken zu sich genommen haben (in Millilitern):

Zeitintervall:	**05:00 - 09:00**	**09:00 - 12:00**	**12:00 - 14:00**	**14:00 - 17:00**	**17:00 - 20:00**	**20:00 - 05:00**
Trinkmilch	ml	ml	ml	ml	ml	ml
Milchgetränke	ml	ml	ml	ml	ml	ml
Kaffee	ml	ml	ml	ml	ml	ml
Ersatz- / Malzkaffee	ml	ml	ml	ml	ml	ml
Schwarzer / grüner Tee	ml	ml	ml	ml	ml	ml
Kräuter- / Früchtetee	ml	ml	ml	ml	ml	ml
Fruchtsaftgetränke, Fruchtsäfte / -nektare	ml	ml	ml	ml	ml	ml
Kalorienverminderte Fruchtsaftgetr. / -nektare	ml	ml	ml	ml	ml	ml
Fruchtschorlen	ml	ml	ml	ml	ml	ml
Limonaden / Brausen	ml	ml	ml	ml	ml	ml
Kalorienverminderte Limonaden	ml	ml	ml	ml	ml	ml
Cola-Getränke	ml	ml	ml	ml	ml	ml
Kalorienverminderte Cola-Getränke	ml	ml	ml	ml	ml	ml
Cola-Mix-Getränke	ml	ml	ml	ml	ml	ml
Eistee-Getränke	ml	ml	ml	ml	ml	ml
Energy Drinks	ml	ml	ml	ml	ml	ml
Sportgetränke	ml	ml	ml	ml	ml	ml
Mineralwasser	ml	ml	ml	ml	ml	ml
Leitungswasser	ml	ml	ml	ml	ml	ml
Bier	ml	ml	ml	ml	ml	ml
Alkoholfreies Bier	ml	ml	ml	ml	ml	ml
Bier-Mischgetränke	ml	ml	ml	ml	ml	ml
Wein / Sekt	ml	ml	ml	ml	ml	ml
Weinschorle	ml	ml	ml	ml	ml	ml
Sonstige alkoholische Mischgetränke	ml	ml	ml	ml	ml	ml
Spirituosen	ml	ml	ml	ml	ml	ml
Andere Getränke (bitte eintragen):	-----------	-----------	-----------	-----------	-----------	-----------
(1)	ml	ml	ml	ml	ml	ml
(2)	ml	ml	ml	ml	ml	ml
(3)	ml	ml	ml	ml	ml	ml

2a) **Haben Sie sich gestern überwiegend im Raum Hamburg (HVV Einzugsgebiet) aufgehalten?**

ja **1** nein **2** --> **Wo waren Sie überwiegend?** Ort: ______________________ (Bundes-)land: ______________

2b) **Markieren Sie die Zeiten, in denen Sie sich gestern in Ihrem eigenen Haushalt aufgehalten haben** (waagerechter Strich):

05:00 06:00 07:00 08:00 **09:00** 10:00 11:00 **12:00** 13:00 **14:00** 15:00 16:00 **17:00** 18:00 19:00 **20:00** 21:00 22:00 23:00 24:00 01:00 02:00 03:00 04:00 **05:00**

3) **Haben Sie gestern ...**

a) **... gefrühstückt?**

nein **1** ja **2** --> **Beginn** um: _____ Uhr _____ Min.

b) **... zu Mittag gegessen?**

nein **1** ja **2** --> **Beginn** um: _____ Uhr _____ Min.

WENN "JA":

c) **... in der Uni-Mensa zu Mittag gegessen?**

nein **1** ja **2**

d) **... zu Abend gegessen?**

nein **1** ja **2** --> **Beginn** um: _____ Uhr _____ Min.

WENN "JA":

e) **... außerhalb Ihres eigenen Haushalts zu Abend gegessen?**

nein **1** ja **2** --> wo genau: ______________________

4) **Und haben Sie gestern ...**

a) **... körperlich gearbeit (z.B. beruflich, im Haushalt / Garten)?**

nein **1**

ja **2** --> **Dauer**: _____ Std. ____ Min. / Tätigkeit: ___________

b) **... Sport betrieben (Saunabesuch eingeschlossen)?**

nein **1**

ja **2** --> **Dauer**: _____ Std. ____ Min. / Sportart: ___________

5) **Alles in allem, wie war gestern ...**

a) **... Ihre körperliche Befindlichkeit?**

miserabel **1** **2** **3** **4** **5** **6** **7** ausgezeichnet

b) **... Ihre Stimmung?**

miserabel **1** **2** **3** **4** **5** **6** **7** ausgezeichnet

Universität Hamburg

Auf dieser und den nachfolgenden Seiten finden Sie eine Reihe von Fragen, die Sie bitte in der vorgegebenen Reihenfolge beantworten. Lesen Sie die Fragentexte und die Überleitungen zwischen den einzelnen Fragenblöcken sorgfältig durch und antworten Sie so, wie es Ihrem tatsächlichen Verhalten bzw. Ihren Meinungen und Ansichten entspricht. Wenn Sie sich bei vorgegebenen Antwortalternativen nicht für eine davon entscheiden können, dann antworten Sie so, wie es für Sie bzw. aus Ihrer Sicht noch am ehesten zutrifft.

Wenn Sie vorgegebene Antwortmöglichkeiten markieren, dann tun Sie das bitte immer so, daß Sie um die entsprechenden Zahlen oder Symbole einen Kreis machen. Machen Sie keine Kreuze, das kann zu Mißverständnissen in der Auswertung führen!

Bearbeiten Sie diese Testmappe in Ihrem eigenen Tempo. Wenn Sie fertig sind, können Sie schon hinausgehen, auch wenn die anderen Teilnehmer noch nicht alle fertig sind.

Wenn Ihnen irgendetwas in dieser Testmappe unklar ist oder wenn Ihnen noch eine Frage zum Trinktagebuch einfallen sollte, melden Sie sich bitte beim Untersuchungsleiter.

Markieren Sie Ihre Antworten mit einem Kreis um die zugehörigen Ziffern oder Symbole!

H1 Ich habe die Anleitung gelesen und bin bereit, jede Frage offen zu beantworten.

stimme ganz und gar nicht zu	1
stimme eher nicht zu	2
teilweise stimme ich zu, teilweise nicht	3
stimme eher zu	4
stimme voll und ganz zu	5

H2 Wie lange ist es her, daß Sie heute zuletzt etwas getrunken haben?

ich habe heute noch gar nichts getrunken	1
vor mehr als 3 Stunden	2
vor 2 bis 3 Stunden	3
vor 1 bis 2 Stunden	4
vor 30 bis 60 Minuten	5
vor weniger als 30 Minuten	6
ich trinke gerade etwas	7

H3	Markieren Sie hier alle Getränketypen, die Sie unter keinen Umständen zu sich nehmen würden, aus welchen Gründen auch immer.	Trinkmilch	1
		Milchgetränke	2
		Kaffee	3
		Ersatz- / Malzkaffee	4
		Schwarzer / grüner Tee	5
		Kräuter- / Früchtetee	6
		Fruchtsaftgetränke, Fruchtsäfte / -nektare	7
		Kalorienverminderte Fruchtsaftgetränke / -nektare	8
		Fruchtschorlen	9
		Limonaden / Brausen	10
		Kalorienverminderte Limonaden	11
		Cola-Getränke	12
		Kalorienverminderte Cola-Getränke	13
		Cola-Mix-Getränke	14
		Eistee-Getränke	15
		Energy Drinks	16
		Sportgetränke	17
		Mineralwasser	18
		Leitungswasser	19
		Bier	20
		Alkoholfreies Bier	21
		Bier-Mischgetränke	22
		Wein / Sekt	23
		Weinschorle	24
		Spirituosen	25
		keinen dieser Getränketypen	27

H4	Wie häufig trinken Sie im allgemeinen Mineralwasser?	(fast) nie	1
		seltener als einmal im Vierteljahr	2
		an 1 bis 2 Tagen im Vierteljahr	3
		an 1 bis 3 Tagen im Monat	4
		an 1 bis 2 Tagen in der Woche	5
		an 3 bis 6 Tagen in der Woche	6
		täglich	7

H5	Und wie war das speziell in den letzten 4 Wochen? Wie oft haben Sie in dieser Zeit Mineralwasser getrunken?	keinmal	1
		sehr selten	2
		selten	3
		manchmal	4
		oft	5
		sehr oft	6

H6	An wievielen der letzten 7 Tage haben Sie Mineralwasser getrunken? Gehen Sie in Gedanken die letzten sieben Tage durch, also die Zeit von gestern bis heute vor einer Woche, und markieren Sie dann die zutreffende Antwort.	In den letzten 7 Tagen habe ich an ...	
		0 Tagen	0
		1 Tag	1
		2 Tagen	2
		3 Tagen	3
		4 Tagen	4
		5 Tagen	5
		6 Tagen	6
		allen 7 Tagen	7
		... Mineralwasser getrunken.	

H7 Und welche Menge Mineralwasser haben Sie in den letzten 7 Tagen insgesamt getrunken? Diese Frage ist vielleicht schwierig zu beantworten, versuchen Sie trotzdem eine realistische Schätzung abzugeben. Tragen Sie die Gesamtmenge in Millilitern ein. (Keine von ... bis ... Werte!) Wenn Sie in den letzten 7 Tagen gar kein Mineralwasser getrunken haben, tragen Sie eine "0" ein.

den letzten 7 Tagen habe ich ca. ...

_________ ml

... Mineralwasser getrunken.

H8 Geben Sie mit Hilfe der Skala an, inwieweit Sie der folgenden Aussage zustimmen oder nicht zustimmen. Sie können Ihre Antwort abstufen, indem Sie dasjenige "X" zwischen den beiden Polen der Skala mit einem Kreis markieren, das Ihrer Antwort am ehesten entspricht.

	stimme ganz und gar nicht zu						**stimme voll und ganz zu**
Ich habe in den letzten 7 Tagen einen hohen Anteil meines Flüssigkeitsbedarfs durch Mineralwasser gedeckt.	X	X	X	X	X	X	X

H9 Nachfolgend finden Sie eine Liste von Situationen , in denen man einen der aufgeführten Getränketypen (oder auch gar kein Getränk) zu sich nehmen kann. Stellen Sie sich die Situationen nacheinander vor und markieren Sie dann für jede davon, welcher der Getränktypen für Sie in der jeweiligen Situation mit der größten Wahrscheinlichkeit in Frage kommt (mit einem Kreis um das zugehörige "X").

Nur 1 Markierung pro Zeile!	Fruchtsaft	Mineral-wasser	Kaffee oder Tee	anderes Getränk	gar kein Getränk
beim Arbeiten / Lernen für die Uni	X	X	X	X	X
in der Unimensa	X	X	X	X	X
beim Lesen	X	X	X	X	X
beim Fernsehen / Video sehen	X	X	X	X	X
beim Musikhören	X	X	X	X	X
auf einer Party / in geselliger Runde	X	X	X	X	X
in einer Kneipe / Bar	X	X	X	X	X
in einem Fast-Food Restaurant / Imbiß	X	X	X	X	X
in einem Restaurant	X	X	X	X	X
während einer Autofahrt	X	X	X	X	X
bei / nach dem Sport	X	X	X	X	X
bei / nach körperlicher Arbeit	X	X	X	X	X
zum Mittagessen	X	X	X	X	X
zum Abendessen	X	X	X	X	X

In den folgenden Fragen geht es um die <u>nächsten 7 Tage</u>, also die Zeit von morgen bis heute in einer Woche.

H 10	Wie oft planen Sie innerhalb der nächsten 7 Tage Mineralwasser zu trinken?	<u>Ich plane, innerhalb der nächsten 7 Tage ...</u>	
		keinmal	1
		sehr selten	2
		selten	3
		manchmal	4
		oft	5
		sehr oft	6
		<u>... Mineralwasser zu trinken.</u>	

H 11	An wievielen der nächsten 7 Tage beabsichtigen Sie, Mineralwasser zu trinken?	<u>Ich beabsichtige, in den nächsten 7 Tagen an...</u>	
		0 Tagen	0
		1 Tag	1
		2 Tagen	2
		3 Tagen	3
		4 Tagen	4
		5 Tagen	5
		6 Tagen	6
		allen 7 Tagen	7
		<u>... Mineralwasser zu trinken.</u>	

H 12	Und welche Menge Mineralwasser beabsichtigen Sie in den nächsten 7 Tagen insgesamt zu trinken? Diese Frage ist wiederum nicht leicht zu beantworten, versuchen Sie trotzdem eine realistische Schätzung abzugeben. Tragen Sie die Gesamtmenge in Millilitern ein. (Keine von ... bis ... Werte!) Wenn Sie in den nächsten 7 Tagen gar kein Mineralwasser zu trinken beabsichtigen, tragen Sie eine "0" ein.	<u>In den nächsten 7 Tagen beabsichtige ich ca.</u> _________ ml <u>... Mineralwasser zu trinken.</u>

H 13	An wievielen der nächsten 7 Tage beabsichtigen Sie, Sport zu treiben (Saunabesuche eingeschlossen)?	<u>Ich beabsichtige, in den nächsten 7 Tagen an...</u>	
		0 Tagen	0
		1 Tag	1
		2 Tagen	2
		3 Tagen	3
		4 Tagen	4
		5 Tagen	5
		6 Tagen	6
		allen 7 Tagen	7
		<u>... Sport zu treiben.</u>	

H 14	Und wieviele Stunden beabsichtigen Sie in den nächsten 7 Tagen insgesamt Sport zu treiben (Saunabesuche eingeschlossen)? Tragen Sie die Gesamtdauer in Stunden und Minuten ein. (Keine von ... bis ... Angaben!) Wenn Sie nicht die Absicht haben, in den nächsten 7 Tagen Sport zu treiben oder in die Sauna zu gehen, tragen Sie "0 Minuten" ein.	<u>In den nächsten 7 Tagen beabsichtige ich ca.</u> _____ Stunden _____ Minuten <u>... Sport zu treiben.</u>

H 15	Denken Sie jetzt bitte an körperliche Arbeiten, wie man sie z.B. im Beruf, im Haushalt oder Garten verrichten kann. An wievielen der nächsten 7 Tage beabsichtigen Sie, körperlich zu arbeiten? Lassen Sie dabei die Zeiten, in denen Sie "Sport treiben" (im Sinne der letzten beiden Fragen) außen vor!	Ich beabsichtige, in den nächsten 7 Tagen an... 0 Tagen 0 1 Tag 1 2 Tagen 2 3 Tagen 3 4 Tagen 4 5 Tagen 5 6 Tagen 6 allen 7 Tagen 7 ... körperlich zu arbeiten.
H 16	Und wieviele Stunden beabsichtigen Sie in den nächsten 7 Tagen insgesamt körperlich zu arbeiten? Tragen Sie die Gesamtdauer in Stunden und Minuten ein (wiederum ohne die Zeiten, in denen Sie evt. Sport treiben). (Keine von ... bis ... Angaben!) Wenn Sie nicht die Absicht haben, in den nächsten 7 Tagen körperlich zu arbeiten, tragen Sie "0 Minuten" ein.	In den nächsten 7 Tagen beabsichtige ich ca. _____ Stunden _____ Minuten ... körperlich zu arbeiten.

H 17 **Geben Sie an, inwieweit Sie den folgenden Aussagen zustimmen oder nicht zustimmen. Sie können Ihre Antworten abstufen, indem Sie dasjenige "X" zwischen den beiden Polen der Skala mit einem Kreis markieren, das Ihrer Antwort am ehesten entspricht.**

Ich habe die Absicht, in den nächsten 7 Tagen ...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... einen hohen Anteil meines Flüssigkeitsbedarfs durch Mineralwasser zu decken.	X	X	X	X	X	X	X
... sehr viel Sport zu treiben.	X	X	X	X	X	X	X
... sehr viel körperlich zu arbeiten.	X	X	X	X	X	X	X

H 18 **Geben Sie wieder an, inwieweit Sie den folgenden Aussagen zustimmen oder nicht zustimmen. Sie können Ihre Antworten erneut abstufen, indem Sie das für Sie am besten passende "X" zwischen den beiden Polen der Skala markieren.**

In den nächsten 7 Tagen viel Mineralwasser zu trinken ...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... wäre eine gute Sache.	X	X	X	X	X	X	X
... würde keinen Spaß machen.	X	X	X	X	X	X	X
... würde mir schaden.	X	X	X	X	X	X	X
... wäre genau das Richtige für mich.	X	X	X	X	X	X	X
... wäre unangenehm.	X	X	X	X	X	X	X

<u>In den nächsten 7 Tagen viel Mineralwasser zu trinken ...</u>	**stimme ganz und gar <u>nicht</u> zu**						**stimme voll und ganz zu**
... wäre ein wertvoller Bestandteil meiner Ernährungsweise.	X	X	X	X	X	X	X
... wäre vernünftig.	X	X	X	X	X	X	X
... wäre unnötig.	X	X	X	X	X	X	X

H 19 **Markieren Sie auch hier, inwieweit Sie den einzelnen Aussagen zustimmen oder nicht zustimmen.**

<u>In den nächsten 7 Tagen viel Sport zu treiben ...</u>	**stimme ganz und gar <u>nicht</u> zu**						**stimme voll und ganz zu**
... wäre ein wertvoller Bestandteil meiner Gesundheitspflege.	X	X	X	X	X	X	X
... würde mir schaden.	X	X	X	X	X	X	X
... würde keinen Spaß machen.	X	X	X	X	X	X	X
... wäre eine gute Sache.	X	X	X	X	X	X	X
... wäre unnötig.	X	X	X	X	X	X	X
... wäre unangenehm.	X	X	X	X	X	X	X
... wäre vernünftig.	X	X	X	X	X	X	X
... wäre genau das Richtige für mich.	X	X	X	X	X	X	X

H 20 **Denken Sie bei den nächsten Fragen an diejenigen Menschen oder Institutionen, deren Meinungen oder Ratschläge im Bezug auf Ernährungsfragen Ihnen persönlich wichtig sind, an Menschen also, auf deren Urteil Sie beim Thema Ernährung wert legen. Das können bei Ihnen vielleicht ganz andere Personen oder Institutionen sein als z.B. bei Ihren Kommiliton(inn)en. Markieren Sie auch hier, inwieweit Sie den einzelnen Aussagen zustimmen oder nicht zustimmen.**

<u>Die meisten Menschen oder Institutionen, deren Meinung zu Ernährungsfragen mir wichtig ist, ...</u>	**stimme ganz und gar <u>nicht</u> zu**						**stimme voll und ganz zu**
... würden es begrüßen, wenn ich einen hohen Anteil meines täglichen Flüssigkeitsbedarfs durch Mineralwasser decken würde.	X	X	X	X	X	X	X
... würden es unterstützen, wenn ich möglichst oft anstelle anderer Getränke Mineralwasser trinken würde.	X	X	X	X	X	X	X

<u>Die meisten Menschen oder Institutionen, deren Meinung zu Ernährungsfragen mir wichtig ist, ...</u>	**stimme ganz und gar <u>nicht</u> zu**						**stimme voll und ganz zu**
... würden mir raten, zusätzlich zu meinem gegenwärtigen Getränkekonsum mehr Mineralwasser zu trinken.	X	X	X	X	X	X	X
... finden, daß es egal ist, wieviel Mineralwasser man trinkt.	X	X	X	X	X	X	X

Vervollständigen Sie jetzt die nächsten beiden Sätze, indem Sie jeweils das aus Ihrer Sicht zutreffende "X" markieren.

<u>Nach meiner Einschätzung trinken die meisten Menschen, deren Meinung zu Ernährungsfragen mir wichtig ist, selber ...</u>

eher selten X X X X X X X eher oft

<u>... Mineralwasser.</u>

<u>Nach meiner Einschätzung decken die meisten Menschen, deren Meinung zu Ernährungsfragen mir wichtig ist, selber einen ...</u>

eher geringen X X X X X X X eher hohen

<u>... Anteil ihres täglichen Flüssigkeitsbedarfs durch Mineralwasser.</u>

H 21 **Vervollständigen Sie wieder die nächsten Sätze bzw. geben Sie wieder an, inwieweit Sie den einzelnen Aussagen zustimmen oder nicht zustimmen.**

<u>In den nächsten 7 Tagen wird meine Entscheidungsfreiheit darüber, ob ich viel oder wenig Mineralwasser trinke, ...</u>

sehr klein X X X X X X X sehr groß

<u>... sein.</u>

<u>Es wäre für mich in den nächsten 7 Tagen ...</u>

sehr schwierig X X X X X X X sehr leicht

<u>... einen hohen Anteil meines täglichen Flüssigkeitsbedarfs durch Mineralwasser zu decken.</u>

<u>Ob ich in den nächsten 7 Tagen viel Mineralwasser trinke, hängt ...</u>

überhaupt nicht X X X X X X X ausschließlich

<u>... von mir selbst ab.</u>

---

	stimme ganz und gar **nicht** zu						stimme voll und ganz zu
Wenn ich wollte, wäre es in den nächsten 7 Tagen sehr leicht für mich, an jedem Tag mindestens einmal Mineralwasser zu trinken.	X	X	X	X	X	X	X
Ob ich in den nächsten 7 Tagen viel Mineralwasser trinken werde oder nicht, hängt in hohem Maße von anderen Menschen in meiner Umgebung ab.	X	X	X	X	X	X	X
Es liegt vor allem an den äußeren Umständen, ob ich in den nächsten 7 Tagen viel oder wenig Mineralwasser trinken werde.	X	X	X	X	X	X	X
Wenn ich in den nächsten 7 Tagen Schwierigkeiten damit hätte, Mineralwasser für meinen eigenen Verbrauch zu besorgen, wäre ich durchaus in der Lage, diese Schwierigkeiten zu überwinden.	X	X	X	X	X	X	X

H 22 Wie sicher oder unsicher sind Sie, daß Sie in den nächsten 7 Tagen in der Lage wären, einen hohen Anteil Ihres täglichen Flüssigkeitsbedarfs durch Mineralwasser zu decken?

vollkommen unsicher	1
sehr unsicher	2
eher unsicher	3
weder unsicher noch sicher	4
eher sicher	5
sehr sicher	6
vollkommen sicher	7

H 23 **Geben Sie zu jeder der folgenden Aussagen wieder an, inwieweit Sie ihr zustimmen oder nicht zustimmen.**

Mineralwasser...	stimme ganz und gar **nicht** zu						stimme voll und ganz zu
... löscht den Durst besser als andere Getränke.	X	X	X	X	X	X	X
... zu trinken macht nicht dick.	X	X	X	X	X	X	X
... ist geschmacksneutral.	X	X	X	X	X	X	X
... ist preisgünstiger als viele andere Getränke.	X	X	X	X	X	X	X
... zu trinken fördert meine Gesundheit.	X	X	X	X	X	X	X
... ist kalorienfrei.	X	X	X	X	X	X	X
... versorgt meinen Körper mit vielen Stoffen, die er benötigt.	X	X	X	X	X	X	X
... zu trinken hält mich körperlich fit.	X	X	X	X	X	X	X
... zu trinken erfrischt mich.	X	X	X	X	X	X	X
... ist zuckerfrei.	X	X	X	X	X	X	X

Mineralwasser...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... paßt zu fast jeder Gelegenheit.	X	X	X	X	X	X	X
... ist langweilig.	X	X	X	X	X	X	X
... enthält keine Vitamine.	X	X	X	X	X	X	X
... zu trinken fördert mein Wohlbefinden.	X	X	X	X	X	X	X
... ist nicht süß im Geschmack.	X	X	X	X	X	X	X
... enthält keine Schadstoffe.	X	X	X	X	X	X	X
... ist ein hygienisch einwandfreies Lebensmittel.	X	X	X	X	X	X	X
... ist gut bekömmlich.	X	X	X	X	X	X	X
... enthält keinen Alkohol.	X	X	X	X	X	X	X
... ist ein qualitativ hochwertiges Lebensmittel.	X	X	X	X	X	X	X

H 24 **Die folgenden Sätze beschreiben Eigenschaften, die ein Getränk aufweisen kann. Vervollständigen Sie jeden dieser Sätze, indem Sie angeben, ob Sie die beschriebene Eigenschaft bei einem Getränk als ganz besonders negativ oder ganz besonders positiv beurteilen. Ihre Antworten können Sie abstufen, indem Sie das Ihrer Bewertung entsprechende "X" mit einem Kreis markieren.**

Bei einem Getränk, das ...	**finde ich diese Eigenschaft ganz besonders negativ.**						**finde ich diese Eigenschaft ganz besonders positiv.**
... preisgünstiger als viele andere Getränke ist, ...	X	X	X	X	X	X	X
... meine Gesundheit fördert, ...	X	X	X	X	X	X	X
... meinen Körper mit vielen Stoffen versorgt, die er benötigt, ...	X	X	X	X	X	X	X
... den Durst besser als andere Getränke löscht,...	X	X	X	X	X	X	X
... mich nicht dick macht, ...	X	X	X	X	X	X	X
... geschmacksneutral ist, ...	X	X	X	X	X	X	X
... kalorienfrei ist, ...	X	X	X	X	X	X	X
... mein Wohlbefinden fördert, ...	X	X	X	X	X	X	X
... zuckerfrei ist, ...	X	X	X	X	X	X	X
... zu fast jeder Gelegenheit paßt, ...	X	X	X	X	X	X	X

<u>Bei einem Getränk, das ...</u>	**finde ich diese Eigenschaft ganz besonders <u>negativ</u>.**						**finde ich diese Eigenschaft ganz besonders <u>positiv</u>.**
... mich körperlich fit hält, ...	X	X	X	X	X	X	X
... mich erfrischt, ...	X	X	X	X	X	X	X
... langweilig ist, ...	X	X	X	X	X	X	X
... gut bekömmlich ist, ...	X	X	X	X	X	X	X
... keinen Alkohol enthält, ...	X	X	X	X	X	X	X
... nicht süß im Geschmack ist, ...	X	X	X	X	X	X	X
... ein qualitativ hochwertiges Lebensmittel ist,...	X	X	X	X	X	X	X
... keine Vitamine enthält, ...	X	X	X	X	X	X	X
... keine Schadstoffe enhält, ...	X	X	X	X	X	X	X
...ein hygienisch einwandfreies Lebensmittel ist, ...	X	X	X	X	X	X	X

H 25 **Gerade haben Sie uns mitgeteilt, inwiefern Sie die genannten Eigenschaften bei einem Getränk als <u>negativ oder positiv</u> beurteilen. Geben Sie jetzt an, <u>wie wichtig</u> jede einzelne dieser Eigenschaften bei Ihrer Entscheidung über die Verwendung eines Getränks in den nächsten 7 Tagen insgesamt für Sie sein wird.**
Vervollständigen Sie jeden der folgenden Sätze, indem Sie angeben, ob die beschriebene Eigenschaft bei der Entscheidung für oder gegen ein Getränk in den nächsten 7 Tagen für Sie persönlich, alles zusammengenommen, <u>vollkommen egal oder außerordentlich wichtig</u> sein wird. Ihre Antworten können Sie wie gewohnt abstufen. Lassen Sie die Linien rechts neben den Skalen zunächst unbeachtet.

<u>Bei der Entscheidung über die Verwendung eines Getränks in den nächsten 7 Tagen ist mir die Frage, ob es ...</u>	**alles in allem vollkommen <u>egal</u>.**						**alles in allem außerordentlich <u>wichtig</u>.**	
... meine Gesundheit fördert, ...	X	X	X	X	X	X	X	___
... den Durst besser als andere Getränke löscht,...	X	X	X	X	X	X	X	___
... kalorienfrei ist, ...	X	X	X	X	X	X	X	___
... meinen Körper mit vielen Stoffen versorgt, die er benötigt, ...	X	X	X	X	X	X	X	___
... geschmacksneutral ist, ...	X	X	X	X	X	X	X	___
... preisgünstiger als viele andere Getränke ist, ...	X	X	X	X	X	X	X	___
... mich nicht dick macht, ...	X	X	X	X	X	X	X	___
... mich erfrischt, ...	X	X	X	X	X	X	X	___
... zuckerfrei ist, ...	X	X	X	X	X	X	X	___
... zu fast jeder Gelegenheit paßt, ...	X	X	X	X	X	X	X	___
... mich körperlich fit hält, ...	X	X	X	X	X	X	X	___
... langweilig ist, ...	X	X	X	X	X	X	X	___
... nicht süß im Geschmack ist, ...	X	X	X	X	X	X	X	___
... keine Schadstoffe enhält, ...	X	X	X	X	X	X	X	___
... keine Vitamine enthält, ...	X	X	X	X	X	X	X	___
... mein Wohlbefinden fördert, ...	X	X	X	X	X	X	X	___
... keinen Alkohol enthält, ...	X	X	X	X	X	X	X	___
... ein qualitativ hochwertiges Lebensmittel ist,...	X	X	X	X	X	X	X	___
...ein hygienisch einwandfreies Lebensmittel ist, ...	X	X	X	X	X	X	X	___
... gut bekömmlich ist, ...	X	X	X	X	X	X	X	___

H 26 **Gehen Sie die auf der vorherigen Seite bearbeitete Liste noch einmal durch und wählen Sie diejenigen sechs Getränkeeigenschaften aus, die in den nächsten 7 Tagen bei Ihrer Entscheidung über die Verwendung eines Getränks am wichtigsten sein werden.**
Stufen Sie die Wichtigkeit dieser sechs Eigenschaften dadurch ab, daß Sie sie in eine Rangreihe bringen. Tragen Sie dazu bei der aus Ihrer Sicht wichtigsten Eigenschaft den Rangplatz "1" als Ziffer auf der Linie rechts neben der zugehörigen Skala ein. Die zweitwichtigste Eigenschaft markieren Sie mit einer "2" auf der zugehörigen Linie. Fahren Sie dann fort bis zur sechstwichtigsten Eigenschaft. Sie können sich dabei an den Angaben orientieren, die Sie gerade eben gemacht haben, indem Sie sich vor allem die Eigenschaften anschauen, bei denen Sie die am weitesten rechts liegenden "X" markiert haben.
Vergeben Sie in jedem Falle genau sechs Rangplätze und vergeben Sie keinen Rang doppelt!

H 27 **Vervollständigen Sie jetzt jeden der folgenden Sätze, indem Sie angeben, ob die beschriebenen Personen oder Gruppen von Personen der Meinung sind, Sie sollten sehr wenig oder sehr viel Mineralwasser trinken. Stufen Sie Ihre Antworten bei Bedarf ab, indem Sie jeweils das aus Ihrer Sicht zutreffende "X" markieren.**

Mein(e) Lebenspartner(in) / Freund(in) ist der Meinung, ich sollte ...

sehr wenig X X X X X X X sehr viel

... Mineralwasser trinken.
(Hinweis: Wenn Sie zur Zeit ohne Lebenspartner(in) / Freund(in) sind, machen Sie hier keine Angabe.)

Mein(e) Mitbewohner(innen) ist / sind der Meinung, ich sollte ...

sehr wenig X X X X X X X sehr viel

... Mineralwasser trinken.
(Hinweis: Wenn Sie in einem Einpersonenhaushalt leben oder lediglich mit Ihrem/r Lebenspartner(in) / Freund(in) zusammen wohnen, machen Sie hier keine Angabe.)

Meine Eltern sind der Meinung, ich sollte ...

sehr wenig X X X X X X X sehr viel

... Mineralwasser trinken.

Ärzte(innen) und Ernährungsberater(innen) sind der Meinung, ich sollte ...

sehr wenig X X X X X X X sehr viel

... Mineralwasser trinken.

Freunde(innen) oder gute Bekannte, mit denen ich in die Kneipe / in die Disco / auf eine Party oder Feier gehe, sind der Meinung, ich sollte ...

sehr wenig X X X X X X X sehr viel

... Mineralwasser trinken.

Leute, die in von mir akzeptierten Medien über Ernährungsthemen berichten, sind der Meinung, ich sollte ...

sehr wenig X X X X X X X sehr viel

... Mineralwasser trinken.

Die Mineralwasserhersteller sind der Meinung, ich sollte ...

sehr wenig X X X X X X X sehr viel

... Mineralwasser trinken.

H 28 **Geben Sie wieder an, inwieweit Sie den folgenden Aussagen zustimmen oder nicht zustimmen.**

Hinweis für die ersten beiden Aussagen:
Nur dann, wenn Sie zur Zeit kein(e)n Lebenspartner(in) haben bzw. wenn Sie in einem Einpersonenhaushalt leben, machen Sie in der entsprechenden Zeile zu "meines(r) Freundes(in) / Lebenspartners(in)" bzw. zu "Mitbewohner(innen)" wieder keine Angabe. Wenn Sie nur mit Ihrem(r) Freund(in) / Lebenspartner(in) in einem Haushalt zusammenleben, machen Sie keine Angabe zu "Mitbewohner(innen)".
Machen Sie ansonsten zu jeder Personengruppe eine Angabe!

Bei der Entscheidung über die Verwendung eines Getränks bin ich im allgemeinen bereit, mich nach den Vorstellungen und Wünschen ...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... meines(r) Freundes(in) / Lebenspartners(in) zu richten.	X	X	X	X	X	X	X
... meiner Mitbewohner(innen) zu richten.	X	X	X	X	X	X	X
... von Ärzte(innen) oder Ernährungsberater(innen) zu richten.	X	X	X	X	X	X	X
... von Mineralwasserherstellern zu richten.	X	X	X	X	X	X	X
... von Freunden(innen) oder guten Bekannten zu richten, mit denen ich in die Kneipe / in die Disco / auf eine Party oder Feier gehe.	X	X	X	X	X	X	X
... von Leuten zu richten, die in von mir akzeptierten Medien über Ernährungsthemen berichten.	X	X	X	X	X	X	X
... meiner Eltern zu richten.	X	X	X	X	X	X	X

H 29 **Geben Sie wieder an, inwieweit Sie den folgenden Aussagen zustimmen oder nicht zustimmen.**

Für die nächsten 7 Tage erwarte ich, ...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... sehr warmes Wetter.	X	X	X	X	X	X	X
... mich häufig in der Uni aufzuhalten.	X	X	X	X	X	X	X
... daß ich häufig in Situationen sein werde, in denen ich etwas trinken möchte und neben Mineralwasser noch andere Getränke zur Auswahl habe.	X	X	X	X	X	X	X
... häufig mit Freunden in geselliger Runde zusammen zu sein.	X	X	X	X	X	X	X
... eher kühle bis kalte Außentemperaturen.	X	X	X	X	X	X	X
... häufig Sport zu treiben.	X	X	X	X	X	X	X
... daß ich ständig und überall, wenn ich etwas trinken möchte, auch Mineralwasser zur Verfügung haben werde.	X	X	X	X	X	X	X
... daß mir oft warm sein wird.	X	X	X	X	X	X	X
... häufig auf einer Party oder Feier zu sein.	X	X	X	X	X	X	X
... daß in meinem Haushalt ständig Mineralwasser vorrätig sein wird.	X	X	X	X	X	X	X

H 30 **Stellen Sie sich jetzt bitte vor, daß die folgenden Situationsbeschreibungen tatsächlich in den nächsten 7 Tagen auf Sie persönlich zutreffen würden.**
Teilen Sie uns mit, inwieweit es Ihnen in jeder dieser Situationen <u>eher schwerer oder eher leichter</u> fallen würde, Mineralwasser zu trinken. Bei Bedarf können Sie Ihre Antworten wieder abstufen.

<u>Wenn es in den nächsten 7 Tagen zutreffen sollte, daß ...</u>	**würde es mir <u>eher schwer</u> fallen, viel Mineralwasser zu trinken.**						**würde es mir <u>eher leicht</u> fallen, viel Mineralwasser zu trinken.**
... ich häufig mit Freunden in geselliger Runde zusammen bin, ...	X	X	X	X	X	X	X
... mir oft warm ist, ...	X	X	X	X	X	X	X
... ich häufig in Situationen bin, in denen ich etwas trinken möchte und neben Mineralwasser noch andere Getränke zur Auswahl habe, ...	X	X	X	X	X	X	X
... ich mich häufig in der Uni aufhalte, ...	X	X	X	X	X	X	X
... die Außentemperaturen eher kühl bis kalt sind, ...	X	X	X	X	X	X	X
... ich ständig und überall, wenn ich etwas trinken möchte, auch Mineralwasser zur Verfügung habe, ...	X	X	X	X	X	X	X
... ich häufig Sport treibe, ...	X	X	X	X	X	X	X
... ich häufig auf einer Party oder Feier bin, ...	X	X	X	X	X	X	X
... das Wetter sehr warm ist, ...	X	X	X	X	X	X	X
... in meinem Haushalt ständig Mineralwasser vorrätig ist, ...	X	X	X	X	X	X	X

H 31 **Geben Sie bei den nächsten Aussagen einfach nur an, ob sie aus Ihrer Sicht <u>richtig oder falsch</u> sind. Wenn Sie bei einer Aussage unsicher sind, markieren Sie die Antwort, die Ihnen <u>am wahrscheinlichsten</u> erscheint. Lassen Sie keine Aussage aus!**

<u>Mineralwasser ...</u>	**Falsch**	**Richtig**
... enthält keine Schadstoffe aus der Umwelt.	X	X
...enthält immer Kohlensäure, die nach dem Einschenken in Bläschen aufsteigt.	X	X
... ist ein reines Naturprodukt und kann nicht industriell hergestellt werden.	X	X
... ist ohne vorhergehende Aufbereitung in einem mikrobiologisch einwandfreien Zustand.	X	X
... darf bis zu 20% aufbereitetes Wasser aus Seen, Talsperren und Flüssen enthalten.	X	X
... wird ausschließlich aus unterirdischen, vor Verunreinigungen geschützten Wasservorkommen gewonnen.	X	X
... läßt sich im eigenen Haushalt aus Leitungswasser herstellen, indem man das Leitungswasser unter Zuhilfenahme eines Sodasprudlers mit Kohlensäure versetzt.	X	X

Mineralwasser ...	Falsch	Richtig
... wird nahezu so abgefüllt, wie es aus der Erde kommt.	X	X
... muß direkt am Quellort in die für den Endverbraucher bestimmten Gefäße abgefüllt werden.	X	X

H 32 **Geben Sie wieder an, inwieweit Sie den folgenden Aussagen zustimmen oder nicht zustimmen.**

	stimme ganz und gar nicht zu						**stimme voll und ganz zu**
Wenn ich zum Essen ausgehe, probiere ich gerne die ungewöhnlichsten Speisen aus, auch wenn ich nicht sicher bin, daß ich sie mögen werde.	X	X	X	X	X	X	X
Bei der Zubereitung von Haupt- oder Zwischenmahlzeiten probiere ich gerne neue Rezepte aus.	X	X	X	X	X	X	X
Ich bin sehr auf meine Gesundheit bedacht.	X	X	X	X	X	X	X
Es macht Spaß, Lebensmittel auszuprobieren, die ich nicht kenne.	X	X	X	X	X	X	X
Ich bezweifle, daß ich es schaffe, wirklich gesund zu essen.	X	X	X	X	X	X	X
Es interessiert mich sehr, was für Speisen die Menschen in anderen Ländern essen.	X	X	X	X	X	X	X
Ich achte sehr auf meine Gesundheit.	X	X	X	X	X	X	X
Ich esse gerne exotische Speisen.	X	X	X	X	X	X	X
Gerichte auf einer Speisekarte, die ich nicht kenne, machen mich neugierig.	X	X	X	X	X	X	X
Ich esse am liebsten Lebensmittelprodukte, die mir vertraut sind.	X	X	X	X	X	X	X
Wenn ich mir vornehme, gesund zu essen, dann halte ich das auch durch.	X	X	X	X	X	X	X
Ich bin neugierig auf Lebensmittelprodukte, die mir nicht vertraut sind.	X	X	X	X	X	X	X
Es fällt mir schwer, ständig auf meine Ernährung zu achten.	X	X	X	X	X	X	X

H 33	**Lesen Sie die folgenden Aussagen genau durch und beantworten Sie bitte jede Frage sorgfältig und möglichst schnell. Lassen Sie keine Frage aus!**

	trifft <u>nicht</u> zu	**trifft zu**
Wenn ich die Kalorienmenge erreicht habe, die ich mir als Grenze gesetzt habe, gelingt es mir meistens, mit dem Essen aufzuhören.	X	X
Ich esse absichtlich kleine Portionen, um nicht zuzunehmen.	X	X
Das Leben ist zu kurz, um sich auch noch mit Diät herumzuschlagen.	X	X
Bei den üblichen Nahrungsmitteln kenne ich ungefähr den Kaloriengehalt.	X	X
Wenn ich während einer Diät "sündige", dann halte ich mich anschließend beim Essen zurück, um wieder auszugleichen.	X	X
Essen macht mir viel Spaß, und ich will es mir nicht durch Kalorienzählen oder Gewichtskontrollen verderben.	X	X
Häufig höre ich auf zu essen, obwohl ich noch gar nicht richtig satt bin.	X	X
Ich halte mich beim Essen bewußt zurück, um nicht zuzunehmen.	X	X
Ich esse alles, was ich möchte und wann ich es will.	X	X
Ich zähle Kalorien, um mein Gewicht unter Kontrolle zu halten.	X	X
Bestimmte Nahrungsmittel meide ich, weil sie dick machen.	X	X
Ich achte sehr auf meine Figur.	X	X

	immer	**oft**	**selten**	**nie**
Wenn Sie zuviel gegessen haben, bringen Sie Gewissensbisse dazu, sich eher zurückzuhalten?	X	X	X	X
Achten Sie darauf, daß Sie keinen Vorrat an verlockenden Lebensmitteln haben?	X	X	X	X
Kaufen Sie häufig kalorienarme Lebensmittel?	X	X	X	X
Essen Sie bewußt langsam, um Ihre Nahrungsaufnahme einzuschränken?	X	X	X	X
Wie häufig kommt es vor, daß Sie bewußt weniger essen, als Sie gern möchten?	X	X	X	X

	sehr	**ziem-lich**	**etwas**	**nein**
Würden Sie Ihre Lebensweise ändern, wenn Sie eine Gewichtsveränderung von fünf Pfund feststellten?	X	X	X	X
Achten Sie darauf, was Sie essen?	X	X	X	X

H 34	Kreuzen Sie an, was auf Ihr Eßverhalten zutrifft (nur eine Antwort):	
	Ich esse, was ich will, wann ich will.	1
	Ich esse gewöhnlich, was ich will, wann ich will.	2
	Ich esse oft, was ich will, wann ich will.	3
	Ich halte mich ebenso oft zurück wie ich nachgebe.	4
	Ich halte mich gewöhnlich zurück, gebe selten nach.	5
	Ich halte mich durchweg zurück, gebe nicht nach.	6

H 35	Wie häufig haben Sie bereits Schlankheitsdiäten gemacht?	
	1 - 3 mal	1
	4 - 8 mal	2
	9 - 15 mal	3
	mehr als 15 mal	4
	in regelmäßigen Abständen	5
	ich halte so gut wie immer Diät	6
	noch nie	7

H 36 Geben Sie wieder an, inwieweit Sie den folgenden Aussagen zustimmen oder nicht zustimmen. Sie können Ihre Antworten bei Bedarf wieder abstufen.

Ich bin mir sicher, mich auch dann gesund ernähren zu können, wenn ...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... ich im Restaurant bin.	X	X	X	X	X	X	X
... ich auf einem größeren Fest bin.	X	X	X	X	X	X	X
... Wochenenden / Feiertage sind.	X	X	X	X	X	X	X
... ich von Freunden(innen) oder Bekannten eingeladen bin.	X	X	X	X	X	X	X
... ich keine Zeit habe, mich um den Einkauf und die Zubereitung von Essen zu kümmern.	X	X	X	X	X	X	X
... ich nicht auffallen will.	X	X	X	X	X	X	X

H 37 Nun bitten wir Sie, zu einigen weiteren Aussagen Stellung zu nehmen. Sie haben dabei die Möglichkeit, jeder Aussage stark (+++), mittel (++) oder schwach (+) zuzustimmen oder sie schwach (-), mittel (--) oder stark (---) abzulehnen. Markieren Sie bitte jeweils das zugeordnete "X", das Ihrer persönlichen Meinung am besten entspricht.

	sehr falsch (---)	(--)	(-)	(+)	(++)	**sehr richtig** (+++)
Ich komme mir machmal taten- und ideenlos vor.	X	X	X	X	X	X
Mehrdeutige Situationen mag ich nicht, da ich nicht weiß, wie ich mich verhalten soll.	X	X	X	X	X	X
Ich weiß oft nicht, wie ich meine Wünsche verwirklichen soll.	X	X	X	X	X	X
Ich kenne viele Möglichkeiten, mich vor Erkrankungen zu schützen.	X	X	X	X	X	X

	sehr falsch (---)	(--)	(-)	(+)	(++)	sehr richtig (+++)
In unklaren oder gefährlichen Situationen weiß ich immer, was ich tun kann.	X	X	X	X	X	X
Manchmal weiß ich überhaupt nicht, was ich in einer Situation machen soll.	X	X	X	X	X	X
Auch in schwierigen Situationen fallen mir immer viele Handlungsalternativen ein.	X	X	X	X	X	X
Für die Lösung von Problemen fallen mir immer viele Möglichkeiten ein.	X	X	X	X	X	X

H 38 Geben Sie wieder an, inwieweit Sie den folgenden Aussagen zustimmen oder nicht zustimmen.

	stimme ganz und gar nicht zu						stimme voll und ganz zu
Für mich ist Essen ein wesentlicher Teil der Lebensfreude.	X	X	X	X	X	X	X
Ich probiere ständig neue und verschiedenartige Speisen aus.	X	X	X	X	X	X	X
Essen gehört zu den schönsten Seiten des Lebens.	X	X	X	X	X	X	X
Ich habe kein Vertrauen zu unbekannten Speisen.	X	X	X	X	X	X	X
Ich nehme das Essen nicht besonders wichtig.	X	X	X	X	X	X	X
Wenn ich nicht genau weiß, welche Zutaten in einer Speise sind, probiere ich sie nicht.	X	X	X	X	X	X	X
Es geht nichts über gutes Essen; ich bin bereit, auch einiges dafür aufzuwenden.	X	X	X	X	X	X	X
Ich mag Speisen aus anderen Ländern.	X	X	X	X	X	X	X
Für ein gutes Essen lasse ich gern alles stehen und liegen.	X	X	X	X	X	X	X
Fremdländische Speisen sehen meist so seltsam aus, daß ich sie kaum essen mag.	X	X	X	X	X	X	X
Gutes Essen macht das Leben erst lebenswert.	X	X	X	X	X	X	X
Bei einer Einladung zum Abendessen probiere ich auch Gerichte aus, die mir nicht vertraut sind.	X	X	X	X	X	X	X

	stimme ganz und gar nicht zu						stimme voll und ganz zu
Essen halte ich für eine ziemlich gleichgültige Angelegenheit.	X	X	X	X	X	X	X
Ich habe ein ungutes Gefühl, wenn ich Speisen esse, die ich zuvor noch nie probiert hatte.	X	X	X	X	X	X	X
Auf die Mahlzeiten freue ich mich immer schon eine ganze Weile vorher.	X	X	X	X	X	X	X
Ich bin sehr wählerisch bei der Auswahl der Speisen, die ich esse.	X	X	X	X	X	X	X
Auf ein besonders schmackhaftes Essen kann ich mich richtig freuen.	X	X	X	X	X	X	X
Ich esse fast alles.	X	X	X	X	X	X	X
Für mich ist das Essen nicht so wichtig; ich esse nur, weil Essen zum täglichen Leben gehört.	X	X	X	X	X	X	X
Ich probiere gerne mal neue, ausländische Restaurants aus.	X	X	X	X	X	X	X

Hiermit ist die Befragung für heute beendet. Wenn Sie alle Fragen beantwortet haben, dann schließen Sie diese Testmappe bitte jetzt und lassen Sie sie an Ihrem Platz liegen.
Anschließend können Sie schon hinausgehen.
Vergessen Sie aber nicht, das Trinktagebuch mitzunehmen!

APPENDIX B

Instruments Used in the Quantitative Main Study

B2 Beverage Diary (Sample Page) and Recording Instructions

Universität Hamburg

Psychologisches Institut I
Projekt "Getränkekonsum im Alltag"
Dipl.-Psych. Carsten Riepe, Tel. .... oder ....

Durchführung der Protokollierung

Liebe(r) Untersuchungsteilnehmer(in),

bitte beachten Sie bei der Teilnahme an unserer Untersuchung die folgenden Hinweise:

1. Protokollieren Sie die von Ihnen selbst konsumierten Getränke und deren Mengen an 7 aufeinanderfolgenden Tagen. Der erste Protokolltag ist morgen, der letzte heute in einer Woche. Jeder Protokolltag beginnt und endet um 5.00 Uhr morgens! Das Trinktagebuch enthält 8 Protokollbögen, einen für jeden Tag und zusätzlich noch einen als Ersatz, falls Sie einen Protokollbogen verderben sollten. Führen Sie das Trinktagebuch möglichst immer bei sich, dann können Sie Ihre Eintragungen überall dort vornehmen, wo Sie sich gerade aufhalten.

2. Sobald Sie einen Protokollbogen fertig bearbeitet haben, nehmen Sie ihn aus dem Tagebuch heraus und stecken ihn in einen der braunen Umschläge. Dadurch liegt im Tagebuch immer das aktuelle Protokoll zuoberst. Bringen Sie den Umschlag mit den bereits ausgefüllten Protokollen nach der Hälfte der Protokolltage in das Psychologische Institut I, Von-Melle-Park 11, 2. Stock (!)
und werfen ihn dort in den großen Briefkasten rechts neben der Glastür.

3. Markieren Sie auf jedem neu begonnenen Protokollbogen oben links den jeweiligen Wochentag mit einem Kreis um die zugehörige Ziffer und tragen Sie oben rechts das Datum ein.

4. Nehmen Sie die Eintragungen im Abschnitt 1) immer am Ende der angegebenen Zeitintervalle vor, also um 9:00, 12:00, 14:00, 17:00, 20:00 Uhr und noch einmal, wenn Sie sich zur Nachtruhe begeben. Sollten Sie einen dieser Termine nicht wahrnehmen können, holen Sie die Eintragungen so bald wie möglich nach! Die Angaben in den Abschnitten 2a) bis 5) machen Sie am besten erst am Ende des Tages. Machen Sie nie Angaben im voraus, sondern immer nur im nachhinein für bereits verstrichene Zeiten. Wenn Sie vorgegebene Antwortmöglichkeiten markieren, dann tun Sie das bitte immer, indem Sie einen Kreis um die zugehörigen Kennziffern machen; nichts ankreuzen!

5. Von besonderer Wichtigkeit sind Ihre Angaben im Abschnitt 1) des Protokollbogens.
- Tragen Sie dort die von Ihnen konsumierten Trinkmengen spaltenweise für jedes Zeitintervall in Millilitern ein.
- Wenn Sie von einem Getränketyp nichts getrunken haben, lassen Sie das zugehörige Feld einfach frei. Wenn Sie in einem ganzen Zeitintervall überhaupt nichts getrunken haben, lassen Sie alle Felder der betreffenden Spalte frei.
- Sollten Sie etwas getrunken haben, was Sie in der Getränkeliste nicht zuordnen können, verwenden Sie hierfür die letzten drei Zeilen des Schemas ("Andere Getränke"). Notieren Sie dann links im Schema den Namen des Getränks.
- Die Trinkmengen sollen möglichst genau protokolliert werden. Am leichtesten ist dies bei vollständig getrunkenen Verkaufseinheiten, z.B. Dosen oder Flaschen aus dem Supermarkt oder Getränken in der Gastronomie. Deren Inhaltsmengen stehen entweder auf dem Packungsetikett oder dem Glas (Eichstrich) oder auf der Speisekarte. Bei der Verwendung von Trinkgefäßen im Haushalt oder auf der Arbeitsstelle ist das Schätzen der getrunkenen Mengen schwieriger. Wir bitten Sie deshalb, den Inhalt der von Ihnen üblicherweise zum Trinken verwendeten Gefäße (Tassen, Gläser, Becher usw.) vor Beginn der Protokollierung mit Hilfe eines Meßbechers zu bestimmen. (Sollten Sie einen Meßbecher leihweise von uns erhalten haben, dann geben Sie ihn am Ende der Protokollierung wieder zurück.) Hier noch einige Trinkgefäße und deren typische Fassungsvermögen: Tasse (ca. 125 ml); Glas (ca. 200 ml); Becher, wie sie z.B. in der Mensa für Kaffee verwendet werden, (ca. 250 ml).

6. Sollten in Ihrem Haushalt noch weitere Personen leben, die mindestens 14 Jahre alt sind, würden wir uns freuen, wenn Sie jeder dieser Personen einen Kurzfragebogen überreichten. Er hilft uns, den Getränkekonsum in Ihrem Haushalt besser zu verstehen. Dazu sollte jede(r) Ihrer Mitbewohner(innen) den Fragebogen einzeln für

sich bearbeiten, ihn dann in den weißen Umschlag stecken und an Sie zurückgeben. Bringen Sie bitte alle ausgefüllten Fragebögen zur Nachuntersuchung mit!

7. Abschließend bitten wir Sie, sich in den 7 Protokolltagen genau so zu verhalten, wie Sie es ohne Teilnahme an dieser Untersuchung getan hätten. Die Auswertung findet vollständig anonym statt! Bitte unterhalten Sie sich mit anderen möglichst wenig über die Untersuchung und widmen Sie Ihr nicht mehr Aufmerksamkeit als für die korrekte Durchführung unbedingt nötig ist.

8. <u>Tragen Sie hier den Termin Ihrer Nachuntersuchung ein:</u>

Tag: ________________ Datum: ___________________ Ort: _______________________________

Bringen Sie zu diesem Termin folgende Dinge mit:
- Alle noch in Ihrem Besitz befindlichen Protokollbögen, auch wenn sie leer sind (Ersatzbogen)
- Falls zutreffend: Den von uns überreichten Meßbecher
- Falls zutreffend: Alle ausgefüllten Kurzfragebögen Ihrer Mitbewohner(innen)

Sollten während der Protokollierung Fragen oder Probleme auftauchen, so rufen Sie bitte Carsten Riepe unter einer der oben genannten Telefonnummern an.

Für Ihre Mitarbeit danken Ihnen ganz herzlich
Prof. Dr. Lothar Buse und Dipl.-Psych. Carsten Riepe

KURZFASSUNG

- Messen Sie das Fassungsvermögen der in Ihrem Haushalt / auf der Arbeit benutzten Trinkgefäße aus!

- Protokollieren Sie Ihren gesamten Getränkekonsum während der nächsten 7 Tage und beantworten Sie alle übrigen Fragen auf den Protokollbögen!

- Ermuntern Sie möglichst alle Ihre Mitbewohner(innen), die 14 Jahre oder älter sind, einen Kurzfragebogen auszufüllen!

- Geben Sie alle bereits bearbeiteten Protokolle nach der Hälfte der Protokolltage zurück (Adresse s.o.)!

- Kommen Sie zum verabredeten Termin zur Nachuntersuchung und bringen Sie alle Materialien mit (s.o.)!

- Essen, trinken und leben Sie ganz so, wie Sie es ohne die Protokollierung getan hätten!

- Bei Fragen oder Problemen melden Sie sich bitte umgehend (Telefonnr. s.o.)!

1. Protokolltag: Mo **1** Di **2** Mi **3** Do **4** Fr **5** Sa **6** So **7** **DATUM:** ________________ **Int.nr.** ______

1) Notieren Sie für jedes Zeitintervall, wieviel Sie von welchen Getränken zu sich genommen haben (in Millilitern):

Zeitintervall:	**05:00 - 09:00**	**09:00 - 12:00**	**12:00 - 14:00**	**14:00 - 17:00**	**17:00 - 20:00**	**20:00 - 05:00**
Trinkmilch	ml	ml	ml	ml	ml	ml
Milchgetränke	ml	ml	ml	ml	ml	ml
Kaffee	ml	ml	ml	ml	ml	ml
Ersatz- / Malzkaffee	ml	ml	ml	ml	ml	ml
Schwarzer / grüner Tee	ml	ml	ml	ml	ml	ml
Kräuter- / Früchtetee	ml	ml	ml	ml	ml	ml
Fruchtsaftgetränke, Fruchtsäfte / -nektare	ml	ml	ml	ml	ml	ml
Kalorienverminderte Fruchtsaftgetr. / -nektare	ml	ml	ml	ml	ml	ml
Fruchtschorlen	ml	ml	ml	ml	ml	ml
Limonaden / Brausen	ml	ml	ml	ml	ml	ml
Kalorienverminderte Limonaden	ml	ml	ml	ml	ml	ml
Cola-Getränke	ml	ml	ml	ml	ml	ml
Kalorienverminderte Cola-Getränke	ml	ml	ml	ml	ml	ml
Cola-Mix-Getränke	ml	ml	ml	ml	ml	ml
Eistee-Getränke	ml	ml	ml	ml	ml	ml
Energy Drinks	ml	ml	ml	ml	ml	ml
Sportgetränke	ml	ml	ml	ml	ml	ml
Mineralwasser	ml	ml	ml	ml	ml	ml
Leitungswasser	ml	ml	ml	ml	ml	ml
Bier	ml	ml	ml	ml	ml	ml
Alkoholfreies Bier	ml	ml	ml	ml	ml	ml
Bier-Mischgetränke	ml	ml	ml	ml	ml	ml
Wein / Sekt	ml	ml	ml	ml	ml	ml
Weinschorle	ml	ml	ml	ml	ml	ml
Sonstige alkoholische Mischgetränke	ml	ml	ml	ml	ml	ml
Spirituosen	ml	ml	ml	ml	ml	ml
Andere Getränke (bitte eintragen):	-----------	-----------	-----------	-----------	-----------	-----------
(1)	ml	ml	ml	ml	ml	ml
(2)	ml	ml	ml	ml	ml	ml
(3)	ml	ml	ml	ml	ml	ml

2a) **Haben Sie sich heute überwiegend im Raum Hamburg (HVV Einzugsgebiet) aufgehalten?**

ja **1** nein **2** --> **Wo waren Sie überwiegend?** Ort: ______________________ (Bundes-)land: ______________

2b) **Markieren Sie die Zeiten, in denen Sie sich heute in Ihrem eigenen Haushalt aufgehalten haben** (waagerechter Strich):

05:00 06:00 07:00 08:00 **09:00** 10:00 11:00 **12:00** 13:00 **14:00** 15:00 16:00 **17:00** 18:00 19:00 **20:00** 21:00 22:00 23:00 24:00 01:00 02:00 03:00 04:00 **05:00**

3) **Haben Sie heute ...**

a) **... gefrühstückt?**

nein **1** ja **2** --> **Beginn** um: _____ Uhr _____ Min.

b) **... zu Mittag gegessen?**

nein **1** ja **2** --> **Beginn** um: _____ Uhr _____ Min.

WENN "JA":

c) **... in der Uni-Mensa zu Mittag gegessen?**

nein **1** ja **2**

d) **... zu Abend gegessen?**

nein **1** ja **2** --> **Beginn** um: _____ Uhr _____ Min.

WENN "JA":

e) **... außerhalb Ihres eigenen Haushalts zu Abend gegessen?**

nein **1** ja **2** --> wo genau: ______________________

4) **Und haben Sie heute ...**

a) **... körperlich gearbeit (z.B. beruflich, im Haushalt / Garten)?**

nein **1**

ja **2** --> **Dauer**: _____ Std. _____ Min. / Tätigkeit: ____________

b) **... Sport betrieben (Saunabesuch eingeschlossen)?**

nein **1**

ja **2** --> **Dauer**: _____ Std. _____ Min. / Sportart: ____________

5) **Alles in allem, wie war heute ...**

a) **... Ihre körperliche Befindlichkeit?**

miserabel **1 2 3 4 5 6 7** ausgezeichnet

b) **... Ihre Stimmung?**

miserabel **1 2 3 4 5 6 7** ausgezeichnet

APPENDIX B

Instruments Used in the Quantitative Main Study

B3 Postmeasurement Questionnaire

(Questions N1a to N45)

Universität Hamburg

Datum: /____//____//____/ Uhrzeit: __________ Interviewnr. ____________

Liebe(r) Untersuchungsteilnehmer(in),

wir bitten Sie, uns zum Abschluß der Untersuchung noch die folgenden Fragen zu beantworten. Beantworten Sie sie wieder in der vorgegebenen Reihenfolge, ohne eine davon auszulassen. Lesen Sie die Fragentexte und die Überleitungen zwischen den einzelnen Fragenblöcken sorgfältig durch und antworten Sie so, wie es Ihrem tatsächlichen Verhalten bzw. Ihren Meinungen und Ansichten entspricht. Wenn Sie sich bei vorgegebenen Antwortalternativen nicht für eine davon entscheiden können, dann antworten Sie so, wie es für Sie bzw. aus Ihrer Sicht noch <u>am ehesten</u> zutrifft.

Wenn Sie vorgegebene Antwortmöglichkeiten markieren, dann tun Sie das bitte wieder so, daß Sie um die entsprechenden Zahlen oder Symbole einen <u>Kreis</u> machen.

Bearbeiten Sie diesen Fragebogen in Ihrem eigenen Tempo. Wenn Sie fertig sind, wenden Sie sich an den Untersuchungsleiter, der Ihnen Ihr Honorar auszahlt bzw. Ihre Vp-Stunden bescheinigt.

Wenn Ihnen irgendetwas unklar ist, melden Sie sich bitte beim Untersuchungsleiter.

Markieren Sie Ihre Antworten mit einem <u>Kreis</u> um die zugehörigen Ziffern oder Symbole!

N1a	Waren die 7 Protokolltage für Ihr Alltagsleben repräsentativ, d.h. haben Sie eine für Ihre Verhältnisse "typische" Woche verbracht?	nein ja	1 # 2

N1b <u># Falls "nein": Wieso waren die 7 Tage nicht "typisch"? (in Stichworten notieren)</u>

N2a	Haben Sie an den 7 Protokolltagen genau so gegessen und getrunken, wie Sie es vermutlich getan hätten, wenn Sie nicht an dieser Untersuchung teilgenommen hätten?	nein unsicher / weiß nicht ja	1 # 2 3

N2b <u># Falls "nein": Was genau haben Sie anders gemacht?</u>

N3a	Würden Sie sagen, daß sich als Folge der erhöhten Aufmerksamkeit, die Sie speziell Ihrem Trinkverhalten gewidmet haben, Ihr Getränkekonsum während der Protokollierung verändert hat?	nein unsicher / weiß nicht ja	1 2 3 #

N3b # Falls "ja": Inwiefern hat sich Ihr Getränkekonsum geändert?

N4	Ist es Ihnen möglich gewesen, die Protokollierungen der Getränketypen und -mengen jeweils am Ende der vorgesehenen Intervalle vorzunehmen?	nein, (fast) keinmal ja, aber eher selten ja, meistens ja, (fast) immer	1 2 3 4
N5	Haben Sie den Inhalt der von Ihnen üblicherweise zum Trinken verwendeten Gefäße (Tassen, Gläser, Becher usw.) vor Beginn der Protokollierung mit Hilfe eines Meßbechers o.ä. bestimmt?	nein teilweise ja	1 2 3
N6	Wären Sie grundsätzlich bereit, unter gleichen Rahmenbedingungen noch einmal an dieser Untersuchung teilzunehmen?	nein unsicher / weiß nicht ja	1 2 3

In den folgenden Fragen geht es wieder um die nächsten 7 Tage, also die Zeit von morgen bis heute in einer Woche.
(Hinweis: Wir werden Sie am Ende nicht fragen, ob Sie noch einmal an dieser Untersuchung teilnehmen wollen!)

N7	Wie oft planen Sie innerhalb der nächsten 7 Tage Mineralwasser zu trinken?	Ich plane, innerhalb der nächsten 7 Tage ... keinmal sehr selten selten manchmal oft sehr oft ... Mineralwasser zu trinken.	 1 2 3 4 5 6
N8	An wievielen der nächsten 7 Tage beabsichtigen Sie, Mineralwasser zu trinken?	Ich beabsichtige, in den nächsten 7 Tagen an... 0 Tagen 1 Tag 2 Tagen 3 Tagen 4 Tagen 5 Tagen 6 Tagen allen 7 Tagen ... Mineralwasser zu trinken.	 0 1 2 3 4 5 6 7

N9 Und welche Menge Mineralwasser beabsichtigen Sie in den nächsten 7 Tagen insgesamt zu trinken?
Diese Frage ist wiederum nicht leicht zu beantworten, versuchen Sie trotzdem eine realistische Schätzung abzugeben. Tragen Sie die Gesamtmenge in Millilitern ein.
(Keine von ... bis ... Werte!)
Wenn Sie in den nächsten 7 Tagen gar kein Mineralwasser zu trinken beabsichtigen, tragen Sie eine "0" ein.

In den nächsten 7 Tagen beabsichtige ich ca.

__________ ml

... Mineralwasser zu trinken.

N10 Geben Sie an, inwieweit Sie der folgenden Aussage zustimmen oder nicht zustimmen. Sie können Ihre Antwort abstufen, indem Sie dasjenige "X" zwischen den beiden Polen der Skala mit einem Kreis markieren, das Ihrer Antwort am ehesten entspricht.

Ich habe die Absicht, in den nächsten 7 Tagen ...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... einen hohen Anteil meines Flüssigkeitsbedarfs durch Mineralwasser zu decken.	X	X	X	X	X	X	X

N11 Geben Sie wieder an, inwieweit Sie den folgenden Aussagen zustimmen oder nicht zustimmen. Sie können Ihre Antworten erneut abstufen, indem Sie das für Sie passende "X" markieren.

In den nächsten 7 Tagen viel Mineralwasser zu trinken ...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... wäre eine gute Sache.	X	X	X	X	X	X	X
... würde keinen Spaß machen.	X	X	X	X	X	X	X
... würde mir schaden.	X	X	X	X	X	X	X
... wäre genau das Richtige für mich.	X	X	X	X	X	X	X
... wäre unangenehm.	X	X	X	X	X	X	X
... wäre ein wertvoller Bestandteil meiner Ernährungsweise.	X	X	X	X	X	X	X
... wäre vernünftig.	X	X	X	X	X	X	X
... wäre unnötig.	X	X	X	X	X	X	X

N12 Denken Sie bei den nächsten Fragen an diejenigen Menschen oder Institutionen, deren Meinungen oder Ratschläge im Bezug auf Ernährungsfragen Ihnen persönlich wichtig sind, an Menschen also, auf deren Urteil Sie beim Thema Ernährung wert legen. Das können bei Ihnen vielleicht ganz andere Personen oder Institutionen sein als z.B. bei Ihren Kommiliton(inn)en. Markieren Sie auch hier, inwieweit Sie den einzelnen Aussagen zustimmen oder nicht zustimmen.

Die meisten Menschen oder Institutionen, deren Meinung zu Ernährungsfragen mir wichtig ist, ...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... würden es begrüßen, wenn ich einen hohen Anteil meines täglichen Flüssigkeitsbedarfs durch Mineralwasser decken würde.	X	X	X	X	X	X	X
... würden es unterstützen, wenn ich möglichst oft anstelle anderer Getränke Mineralwasser trinken würde.	X	X	X	X	X	X	X
... würden mir raten, zusätzlich zu meinem gegenwärtigen Getränkekonsum mehr Mineralwasser zu trinken.	X	X	X	X	X	X	X
... finden, daß es egal ist, wieviel Mineralwasser man trinkt.	X	X	X	X	X	X	X

Vervollständigen Sie jetzt die nächsten beiden Sätze, indem Sie jeweils das aus Ihrer Sicht zutreffende "X" markieren.

Nach meiner Einschätzung trinken die meisten Menschen, deren Meinung zu Ernährungsfragen mir wichtig ist, selber ...

eher selten X X X X X X X eher oft

... Mineralwasser.

Nach meiner Einschätzung decken die meisten Menschen, deren Meinung zu Ernährungsfragen mir wichtig ist, selber einen ...

eher geringen X X X X X X X eher hohen

... Anteil ihres täglichen Flüssigkeitsbedarfs durch Mineralwasser.

N13 Vervollständigen Sie wieder die nächsten Sätze bzw. geben Sie wieder an, inwieweit Sie den einzelnen Aussagen zustimmen oder nicht zustimmen.

In den nächsten 7 Tagen wird meine Entscheidungsfreiheit darüber, ob ich viel oder wenig Mineralwasser trinke, ...

sehr klein X X X X X X X sehr groß

... sein.

Es wäre für mich in den nächsten 7 Tagen ...

sehr schwierig X X X X X X X sehr leicht

... einen hohen Anteil meines täglichen Flüssigkeitsbedarfs durch Mineralwasser zu decken.

Ob ich in den nächsten 7 Tagen viel Mineralwasser trinke, hängt ...

überhaupt nicht	X	X	X	X	X	X	X	ausschließlich

... von mir selbst ab.

	stimme ganz und gar nicht zu						**stimme voll und ganz zu**
Wenn ich wollte, wäre es in den nächsten 7 Tagen sehr leicht für mich, an jedem Tag mindestens einmal Mineralwasser zu trinken.	X	X	X	X	X	X	X
Ob ich in den nächsten 7 Tagen viel Mineralwasser trinken werde oder nicht, hängt in hohem Maße von anderen Menschen in meiner Umgebung ab.	X	X	X	X	X	X	X
Es liegt vor allem an den äußeren Umständen, ob ich in den nächsten 7 Tagen viel oder wenig Mineralwasser trinken werde.	X	X	X	X	X	X	X
Wenn ich in den nächsten 7 Tagen Schwierigkeiten damit hätte, Mineralwasser für meinen eigenen Verbrauch zu besorgen, wäre ich durchaus in der Lage, diese Schwierigkeiten zu überwinden.	X	X	X	X	X	X	X

N14 Wie sicher oder unsicher sind Sie, daß Sie in den nächsten 7 Tagen in der Lage wären, einen hohen Anteil Ihres täglichen Flüssigkeitsbedarfs durch Mineralwasser zu decken?

vollkommen unsicher	1
sehr unsicher	2
eher unsicher	3
weder unsicher noch sicher	4
eher sicher	5
sehr sicher	6
vollkommen sicher	7

Machen Sie jetzt bitte noch einige Angaben zu den 7 Tagen, in denen Sie das Trinktagebuch geführt haben.

N15 Wie häufig waren Sie während der 7 Protokolltage noch bis spät in die Nacht aktiv (z.B. weil Sie im Schichtdienst gearbeitet oder für eine Klausur gelernt haben oder weil Sie noch "auf der Piste" waren)?

Ich war bis spät in die Nacht aktiv an ...	
0 Tagen	0
1 Tag	1
2 Tagen	2
3 Tagen	3
4 Tagen	4
5 Tagen	5
6 Tagen	6
allen 7 Tagen	7

N16 Wie würden Sie insgesamt Ihren Gesundheitszustand während der 7 Protokolltage beschreiben?

sehr schlecht	1
schlecht	2
weder schlecht noch gut	3
gut	4
sehr gut	5

N17	Wie häufig haben Sie während der 7 Protokolltage geraucht?	Während der 7 Protokolltage habe ich an ...	
		0 Tagen	0
		1 Tag	1
		2 bis 6 Tagen	2
		allen 7 Tagen	3
		... geraucht.	
N18	Sind Sie während der 7 Protokolltage in ärztlicher Behandlung gewesen?	nein	1
		ja	2
N19	Wie häufig haben Sie während der 7 Protokolltage Medikamente eingenommen (einschließlich Kontrazeptiva)?	Während der 7 Protokolltage habe ich an ...	
		0 Tagen	0
		1 Tag	1
		2 Tagen	2
		3 Tagen	3
		4 Tagen	4
		5 Tagen	5
		6 Tagen	6
		allen 7 Tagen	7
		... Medikamente eingenommen.	
N20	Haben Sie während der 7 Protokolltage aufgrund ärztlicher Empfehlung nach einer bestimmten Diät oder Kostform gelebt?	nein	1
		ja	2
N21	Haben Sie während der 7 Protokolltage von sich aus nach einer bestimmten Diät oder Kostform gelebt (z.B. vegetarisch)?	nein	1
		ja	2

Jetzt haben wir noch ein paar Fragen zu verschiedenen Themen.

N22	Markieren Sie hier Ihr Geschlecht.	weiblich	1
		männlich	2
N23	Wie alt sind Sie?	Ich bin _________ Jahre alt.	
N24	Leiden Sie an einer chronischen Erkrankung, die Einfluß auf Ihre Ernährungsweise hat?	nein	1
		unsicher / weiß nicht	2
		ja	3
N25	Tragen Sie Ihre Körpergröße (ohne Schuhe) in Zentimetern ein.	Meine Körpergröße beträgt ...	
		_________ cm	
N26	Tragen Sie Ihr Körpergewicht in Kilogramm ein.	Mein Körpergewicht beträgt zur Zeit ...	
		_________ kg	

N27	Wie zufrieden sind Sie mit Ihrem derzeitigen Körpergewicht?	<u>Ich bin mit meinem Körpergewicht ...</u>	
		... sehr unzufrieden	1
		... unzufrieden	2
		... weder unzufrieden noch zufrieden	3
		... zufrieden	4
		... sehr zufrieden	5

N28	In welcher Richtung würden Sie Ihr derzeitiges Körpergewicht gerne verändern?	<u>Ich würde gerne ...</u>	
		... stark abnehmen	1
		... etwas abnehmen	2
		... weder abnehmen noch zunehmen	3
		... etwas zunehmen	4
		... stark zunehmen	5

N29	An welcher Hochschule sind Sie eingeschrieben?	Universität Hamburg	1
		Hochschule für Wirtschaft und Politik	2
		Fachhochschule Hamburg	3
		andere, und zwar: (bitte eintragen) ______________________	4
		ich bin an keiner Hochschule eingeschrieben	5

N30	Wenn Sie Student(in) sind, dann tragen Sie hier Ihr(e) <u>Haupt</u>fach (-fächer) und Ihr derzeitiges Fachsemester ein.	Ich studiere im Hauptfach: ______________________
		und bin jetzt im __________ ten Fachsemester

N31	In welcher Art von Haushalt wohnen Sie? Lesen Sie zuerst alle Antwortmöglichkeiten genau durch, bevor Sie sich für eine entscheiden. Markieren Sie nur eine Antwort. Wenn keine Antwortmöglichkeit voll zutreffen sollte, tragen Sie Ihren Haushaltstyp bitte in eigenen Worten ein.	Ich wohne ...	
		... im Haushalt meiner Eltern.	1
		... alleine in meinem eigenen (Single-) Haushalt.	2
		... zusammen mit meinem(r) Freund(in) / Lebenspartner(in) in einem Zweipersonenhaushalt.	3
		... zusammen mit meinem(r) Freund(in) / Lebenspartner(in) und eigenem(n) Kind(ern).	4
		... als Alleinerziehende(r) im eigenen Haushalt nur zusammen mit eigenem(n) Kind(ern).	5
		... in einer Wohngemeinschaft zusammen mit meinem(r) Freund(in) / Lebenspartner(in) und noch anderen Personen.	6
		... in einer Wohngemeinschaft, aber nicht mit meinem(r) Freund(in) / Lebenspartner(in) zusammen.	7
		... in einem anderen Haushaltstyp, nämlich (bitte eintragen) ____________________ ____________________	8
N32	Haben Sie bereits eine Berufsausbildung abgeschlossen (z.B. Lehre, Berufsfachschule, Studium)? Wenn ja, geben Sie bitte an, um welche es sich handelt.	nein	1
		ja, und zwar als (bitte eintragen): ____________________	2
N33	Sind Sie neben Ihrem Studium noch berufstätig bzw. jobben Sie regelmäßig? Wenn ja, geben Sie bitte an, welche Tätigkeit Sie verrichten.	nein	1
		ja, und zwar als (bitte eintragen): ____________________	2
N34	Sind Sie überwiegend bei Ihren Eltern / einem Ihrer Elternteile aufgewachsen?	nein	1
		ja	2
N35	Wo sind Sie überwiegend aufgewachsen? Sie können mehrere Möglichkeiten markieren.	Deutschland, alte Bundesländer	1
		Deutschland, neue Bundesländer	2
		woanders, nämlich (bitte eintragen): ____________________	3

N36 Welchen höchsten Schulabschluß haben Ihre Eltern?
Bitte markieren Sie das Zutreffende getrennt für Ihre Mutter und Ihren Vater.

	Mutter	Vater
keinen Schulabschluß	1	1
Haupt- / Volksschule	2	2
Real- / Mittelschule	3	3
Fachhochschulreife	4	4
Allgemeine Hochschulreife	5	5
anderen Schulabschluß, nämlich (bitte eintragen):	6	6
Mutter: ____________________		
Vater: ____________________		
unsicher / weiß nicht	7	7

N37 Welche abgeschlossene(n) Berufsausbildung(en) haben Ihre Eltern?
Bitte markieren Sie alles, was zutrifft, getrennt für Ihre Mutter und Ihren Vater.

	Mutter	Vater
keine abgeschlossene Berufsausbildung	1	1
Lehre mit Abschluß	2	2
Fachschule, Gewerbeschule, Technikerschule mit Abschluß oder Meisterbrief	3	3
Fachhochschulabschluß	4	4
Universitätsabschluß	5	5
noch andere abgeschlossene Berufsausbildung, nämlich (bitte eintragen):	6	6
Mutter: ____________________		
Vater: ____________________		
unsicher / weiß nicht	7	7

N38 Welchen Beruf üben Ihre Eltern zur Zeit aus bzw. welchen haben sie zuletzt ausgeübt?
Bitte markieren Sie das Zutreffende getrennt für Ihre Mutter und Ihren Vater.

	Mutter	Vater
Größere Selbständige	1	1
Mittlere Selbständige	2	2
Kleine Selbständige	3	3
Freie Berufe, selbständige Akademiker	4	4
Selbständige Landwirte	5	5
Höhere leitende Angestellte	6	6
Mittlere leitende Angestellte	7	7
Qualifizierte Angestellte	8	8
Ausführende Angestellte	9	9
Beamte im höheren Dienst	10	10
Beamte im gehobenen Dienst	11	11
Beamte im mittleren Dienst	12	12
Beamte im einfachen Dienst	13	13
Facharbeiter (mit Lehre)	14	14
Angelernte Arbeiter	15	15
Ungelernte Arbeiter	16	16
Hausfrau / -mann	17	17
nie berufstätig gewesen	18	18
noch anderen Beruf, nämlich (bitte eintragen):	19	19

Mutter: ____________________

Vater: ______________________

unsicher / weiß nicht	20	20

N39 Wie würden Sie die soziale Stellung Ihrer Eltern einschätzen?

Unterschicht	1
Obere Unterschicht	2
Untere Mittelschicht	3
Mittelschicht	4
Obere Mittelschicht	5
Untere Oberschicht	6
Oberschicht	7

N40 Welche Staatsbürgerschaft haben Ihre Eltern?

	Mutter	Vater
deutsch	1	1
andere Nationalität, nämlich (bitte eintragen):	2	2

Mutter: ____________________

Vater: ______________________

N41 Wenn Sie Ihre persönlichen Einkünfte zusammenrechnen, also z.B. Einkünfte aus eigener Erwerbsarbeit, Unterstützung durch Familienangehörige, BAföG, Wohngeld usw., wie hoch ist dann Ihr persönliches Nettoeinkommen, das Sie selbst monatlich im Schnitt zur Verfügung haben? Markieren Sie bitte die für Sie zutreffende Kategorie.

unter 250 Euro (unter 500 DM)	1
250 - 500 Euro (500 - 1000 DM)	2
500 - 750 Euro (1000 - 1500 DM)	3
750 - 1000 Euro (1500 - 2000 DM)	4
1000 - 1250 Euro (2000 - 2500 DM)	5
1250 - 1500 Euro (2500 - 3000 DM)	6
1500 - 1750 Euro (3000 - 3500 DM)	7
1750 - 2000 Euro (3500 - 4000 DM)	8
über 2000 Euro (über 4000 DM)	9

Zum Abschluß dieser Untersuchung kommen wir noch einmal kurz zurück zum Thema Mineralwasser.

N42 Geben Sie in knappen Stichworten an, was Sie unter dem Begriff "Mineralwasser" verstehen:

N43 Welchen Kohlensäuregehalt mögen Sie bei Mineralwasser am liebsten?

Ich mag Mineralwasser am liebsten ...

... mit viel Kohlensäure	1
... mit wenig Kohlensäure	2
... ganz ohne Kohlensäure	3

N44 Wieviel Flüssigkeit sollte ein Erwachsener durchschnittlich am Tag in Form von Getränken zu sich nehmen?
Tragen Sie die Gesamtmenge in Millilitern ein.
(Keine von ... bis ... Werte!)

Ein Erwachsener sollte am Tag durchschnittlich ca.

_________ ml

... Flüssigkeit in Form von Getränken zu sich nehmen.

N45 Verwenden Sie Geräte, mit deren Hilfe man Leitungswasser so mit Kohlensäure versetzen kann, daß es beim Einfüllen in ein Glas sprudelt?

nein	1
ja	2

Überprüfen Sie, ob Sie jede Frage beantwortet haben. Dann geben Sie diesen Fragebogen an den Untersuchungsleiter zurück.

Vielen Dank für Ihre Mitarbeit!

APPENDIX B

Instruments Used in the Quantitative Main Study

B4 Questionnaire for Persons Living Together With the Participants

(Questions M1 to M19)

Universität Hamburg

Psychologisches Institut I
Von-Melle-Park 11
20146 Hamburg

Int.nr. ________//_______

Liebe(r) Mitbewohner(in) unseres(r) Untersuchungsteilnehmers(in),

am Fachbereich Psychologie der Universität Hamburg wird zur Zeit eine Untersuchung zum Thema „Getränkekonsum im Alltag“ durchgeführt (Betreuer: Prof. Dr. Lothar Buse). Ein Mitglied Ihres Haushalts, von dem Sie diesen Fragebogen erhalten haben, hat sich freundlicherweise für eine Teilnahme an dieser Untersuchung bereiterklärt.

Um ein möglichst umfassendes Verständnis vom Getränkekonsum unter Alltagsbedingungen zu erhalten, wenden wir uns nun auch an Sie als eine Person, mit der unser(e) Untersuchungsteilnehmer(in) in einer Haushaltsgemeinschaft zusammenlebt. Für uns ist es sehr wichtig, auch von Ihnen ein paar Fragen beantwortet zu bekommen. Wir bitten Sie deshalb, den nachfolgenden Fragebogen auszufüllen und dem(r) Untersuchungsteilnehmer(in) wieder zurückzugeben. Sie können den Fragebogen dazu falten und in den mitgelieferten weißen Briefumschlag stecken. Ihr(e) Mitbewohner(in) wird Ihren Fragebogen dann an uns zurückgeben.

Selbstverständlich ist Ihre Teilnahme völlig freiwillig. Die gesamte Auswertung erfolgt komplett anonym, Rückschlüsse auf Ihre Identität oder die Ihres(r) Mitbewohners(in) werden zu keiner Zeit möglich sein!

Wenn Sie zum Ausfüllen dieses Fragebogens bereit sind, lesen Sie bitte weiter:

Auf dieser und den nachfolgenden Seiten finden Sie eine Reihe von Fragen, die Sie bitte beantworten. Lesen Sie die Fragentexte und die Überleitungen zwischen den einzelnen Fragenblöcken sorgfältig durch und antworten Sie so, wie es Ihrem tatsächlichen Verhalten bzw. Ihren Meinungen und Ansichten entspricht. Wenn Sie sich bei vorgegebenen Antwortalternativen nicht für eine davon entscheiden können, dann antworten Sie so, wie es für Sie bzw. aus Ihrer Sicht noch am ehesten zutrifft.

Wenn Sie vorgegebene Antwortmöglichkeiten markieren, dann tun Sie das bitte immer so, daß Sie um die entsprechenden Zahlen oder Symbole einen Kreis machen. Machen Sie keine Kreuze, das kann zu Mißverständnissen in der Auswertung führen!

Markieren Sie Ihre Antworten mit einem Kreis um die zugehörigen Ziffern oder Symbole!

M1	Ich habe die Anleitung gelesen und bin bereit, jede Frage offen zu beantworten.	stimme ganz und gar nicht zu	1
		stimme eher nicht zu	2
		teilweise stimme ich zu, teilweise nicht	3
		stimme eher zu	4
		stimme voll und ganz zu	5

M2 Markieren Sie alle Getränketypen, die Sie unter keinen Umständen zu sich nehmen würden, aus welchen Gründen auch immer.

Trinkmilch	1
Milchgetränke	2
Kaffee	3
Ersatz- / Malzkaffee	4
Schwarzer / grüner Tee	5
Kräuter- / Früchtetee	6
Fruchtsaftgetränke, Fruchtsäfte / -nektare	7
Kalorienverminderte Fruchtsaftgetränke / -nektare	8
Fruchtschorlen	9
Limonaden / Brausen	10
Kalorienverminderte Limonaden	11
Cola-Getränke	12
Kalorienverminderte Cola-Getränke	13
Cola-Mix-Getränke	14
Eistee-Getränke	15
Energy Drinks	16
Sportgetränke	17
Mineralwasser	18
Leitungswasser	19
Bier	20
Alkoholfreies Bier	21
Bier-Mischgetränke	22
Wein / Sekt	23
Weinschorle	24
Spirituosen	25
keinen dieser Getränketypen	27

(M3)
M4 Wie häufig trinken Sie im allgemeinen Mineralwasser?

(fast) nie	1
seltener als einmal im Vierteljahr	2
an 1 bis 2 Tagen im Vierteljahr	3
an 1 bis 3 Tagen im Monat	4
an 1 bis 2 Tagen in der Woche	5
an 3 bis 6 Tagen in der Woche	6
täglich	7

M5 Und wie war das speziell in den letzten 4 Wochen? Wie oft haben Sie in dieser Zeit Mineralwasser getrunken?

keinmal	1
sehr selten	2
selten	3
manchmal	4
oft	5
sehr oft	6

M6 An wievielen der letzten 7 Tage haben Sie Mineralwasser getrunken? Gehen Sie in Gedanken die letzten sieben Tage durch, also die Zeit von gestern bis heute vor einer Woche, und markieren Sie dann die zutreffende Antwort.

In den letzten 7 Tagen habe ich an ...	
0 Tagen	0
1 Tag	1
2 Tagen	2
3 Tagen	3
4 Tagen	4
5 Tagen	5
6 Tagen	6
allen 7 Tagen	7
... Mineralwasser getrunken.	

M7	**Geben Sie zu jeder der folgenden Aussagen an, inwieweit Sie ihr zustimmen oder nicht zustimmen. Sie können Ihre Antworten abstufen, indem Sie das für Sie am besten passende "X" zwischen den beiden Polen der Skala markieren.**

Mineralwasser...	**stimme ganz und gar nicht zu**						**stimme voll und ganz zu**
... löscht den Durst besser als andere Getränke.	X	X	X	X	X	X	X
... zu trinken macht nicht dick.	X	X	X	X	X	X	X
... ist geschmacksneutral.	X	X	X	X	X	X	X
... ist preisgünstiger als viele andere Getränke.	X	X	X	X	X	X	X
... zu trinken fördert meine Gesundheit.	X	X	X	X	X	X	X
... ist kalorienfrei.	X	X	X	X	X	X	X
... versorgt meinen Körper mit vielen Stoffen, die er benötigt.	X	X	X	X	X	X	X
... zu trinken hält mich körperlich fit.	X	X	X	X	X	X	X
... zu trinken erfrischt mich.	X	X	X	X	X	X	X
... ist zuckerfrei.	X	X	X	X	X	X	X
... paßt zu fast jeder Gelegenheit.	X	X	X	X	X	X	X
... ist langweilig.	X	X	X	X	X	X	X
... enthält keine Vitamine.	X	X	X	X	X	X	X
... zu trinken fördert mein Wohlbefinden.	X	X	X	X	X	X	X
... ist nicht süß im Geschmack.	X	X	X	X	X	X	X
... enthält keine Schadstoffe.	X	X	X	X	X	X	X
... ist ein hygienisch einwandfreies Lebensmittel.	X	X	X	X	X	X	X
... ist gut bekömmlich.	X	X	X	X	X	X	X
... enthält keinen Alkohol.	X	X	X	X	X	X	X
... ist ein qualitativ hochwertiges Lebensmittel.	X	X	X	X	X	X	X

**M8 Die folgenden Sätze beschreiben Eigenschaften, die ein Getränk aufweisen kann.
Vervollständigen Sie jeden dieser Sätze, indem Sie angeben, ob Sie die beschriebene Eigenschaft bei einem Getränk als <u>ganz besonders negativ oder ganz besonders positiv</u> beurteilen.
Ihre Antworten können Sie wieder abstufen, indem Sie das Ihrer Bewertung entsprechende "X" mit einem Kreis markieren.**

<u>**Bei einem Getränk, das ...**</u>	**finde ich diese Eigenschaft ganz besonders <u>negativ</u>.**						**finde ich diese Eigenschaft ganz besonders <u>positiv</u>.**
... preisgünstiger als viele andere Getränke ist, ...	X	X	X	X	X	X	X
... meine Gesundheit fördert, ...	X	X	X	X	X	X	X
... meinen Körper mit vielen Stoffen versorgt, die er benötigt, ...	X	X	X	X	X	X	X
... den Durst besser als andere Getränke löscht,...	X	X	X	X	X	X	X
... mich nicht dick macht, ...	X	X	X	X	X	X	X
... geschmacksneutral ist, ...	X	X	X	X	X	X	X
... kalorienfrei ist, ...	X	X	X	X	X	X	X
... mein Wohlbefinden fördert, ...	X	X	X	X	X	X	X
... zuckerfrei ist, ...	X	X	X	X	X	X	X
... zu fast jeder Gelegenheit paßt, ...	X	X	X	X	X	X	X
... mich körperlich fit hält, ...	X	X	X	X	X	X	X
... mich erfrischt, ...	X	X	X	X	X	X	X
... langweilig ist, ...	X	X	X	X	X	X	X
... gut bekömmlich ist, ...	X	X	X	X	X	X	X
... keinen Alkohol enthält, ...	X	X	X	X	X	X	X
... nicht süß im Geschmack ist, ...	X	X	X	X	X	X	X
... ein qualitativ hochwertiges Lebensmittel ist,...	X	X	X	X	X	X	X
... keine Vitamine enthält, ...	X	X	X	X	X	X	X
... keine Schadstoffe enhält, ...	X	X	X	X	X	X	X
...ein hygienisch einwandfreies Lebensmittel ist, ...	X	X	X	X	X	X	X

Jetzt haben wir noch ein paar Fragen zu verschiedenen Themen.

M9	Wie häufig nehmen Sie gemeinsam mit unserem(r) Untersuchungsteilnehmer(in) Mahlzeiten ein?	(fast) nie	1
		seltener als einmal in der Woche	2
		an 1 bis 2 Tagen in der Woche	3
		an 3 bis 4 Tagen in der Woche	4
		an 5 bis 6 Tagen in der Woche	5
		mindestens einmal täglich	6
		mehrmals täglich	7
		(fast) immer	8

M 10	Wie häufig kaufen Sie gemeinsam mit unserem(r) Untersuchungsteilnehmer(in) Lebensmittel ein?	(fast) nie	1
		sehr selten	2
		selten	3
		manchmal	4
		oft	5
		sehr oft	6

M 11	Wie lange kennen Sie unsere(n) Untersuchungsteilnehmer(in) schon?	seit weniger als 3 Monaten	1
		seit 3 Monaten bis unter 6 Monaten	2
		seit 6 Monaten bis unter 12 Monaten	3
		seit 1 Jahr bis unter 2 Jahren	4
		seit 2 Jahren bis unter 5 Jahren	5
		seit 5 Jahren bis unter 10 Jahren	6
		seit 10 Jahren bis unter 15 Jahren	7
		seit 15 Jahren bis unter 20 Jahren	8
		seit 20 Jahren bis unter 25 Jahren	9
		seit 25 Jahren bis unter 30 Jahren	10
		seit 30 Jahren oder länger	11

M 12 In welcher verwandtschaftllichen /freundschaftlichen / bekanntschaftlichen Beziehung stehen Sie zu unserem(r) Untersuchungsteilnehmer(in)? Ergänzen Sie bitte den angefangenen Satz und tragen Sie ein, was unser(e) Untersuchungsteilnehmer(in) für Sie ist!

Der(die) Untersuchungsteilnehmer(in) ist mein(e) ...

____

(z.B. Tochter, Vater, Schwester, Freund, Lebenspartnerin, Mitbewohner usw.)

M 13	An welcher Hochschule sind Sie selbst eingeschrieben?	Universität Hamburg	1
		Hochschule für Wirtschaft und Politik	2
		Fachhochschule Hamburg	3
		andere, und zwar: (bitte eintragen) ________________	4
		ich bin an keiner Hochschule eingeschrieben	5

M 14	Welchen höchsten Schulabschluß haben Sie?	keinen Schulabschluß 1 Haupt- / Volksschule 2 Real- / Mittelschule 3 Fachhochschulreife 4 Allgemeine Hochschulreife 5 anderen Schulabschluß, nämlich (bitte eintragen): 6 ____________________
M 15	Welche abgeschlossene(n) Berufsausbildung(en) haben Sie? Bitte markieren Sie alles, was zutrifft.	keine abgeschlossene Berufsausbildung 1 Lehre mit Abschluß 2 Fachschule, Gewerbeschule, Technikerschule mit Abschluß oder Meisterbrief 3 Fachhochschulabschluß 4 Universitätsabschluß 5 noch andere abgeschlossene Berufsausbildung, nämlich (bitte eintragen): 6 ____________________
M 16	Markieren Sie bitte Ihr Geschlecht.	weiblich 1 männlich 2
M 17	Wie alt sind Sie?	Ich bin ________ Jahre alt.
M 18	Sind Sie innerhalb der letzten 12 Monate schon einmal zum Thema "Getränkekonsum im Alltag" befragt worden oder haben Sie selbst als Interviewer(in) andere zu diesem Thema befragt?	nein 1 weiß nicht 2 ja 3
M 19	Nehmen Sie zur Zeit ebenfalls als Untersuchungsteilnehmer(in) an diesem Projekt teil oder beabsichtigen Sie, dies in Zukunft noch zu tun?	nein 1 ja 2

Überprüfen Sie jetzt bitte, ob Sie jede Frage beantwortet haben. Danach geben Sie diesen Fragebogen an den (die) Untersuchungsteilnehmer(in) zurück.

Vielen Dank für Ihre Mitarbeit. Ihre Antworten sind sehr wertvoll für uns!

Prof. Dr. Lothar Buse und Dipl.-Psych. Carsten Riepe

APPENDIX C

Results From the Qualitative Elicitation Study

Table C1

Advantages of Drinking Mineral Water (Responses to Question V5)

Response	*n*
quenches thirst (better than other beverages); best at quenching thirst	27
healthy; contains what the body requires (e.g., minerals); healthier than tap water	19
cheap; inexpensive; good value for money	15
low-calorie; little / no calories; little / no sugar	9
neutral in taste	7
refreshing	6
is always available when being at home; is on stock in every household	5
good for my body shape; salves consciences; does not make me gain weight	4
free of sugar and therefore suitable for diabetics	3
obtainable everywhere	2
tastes good	2
no advantages / no answer	-

Note. $N = 40$. Single mentions (i.e., $n = 1$) are omitted. English translation by the present author.

Table C2

Disadvantages of Drinking Mineral Water (Responses to Question V6)

Response	*n*
tasteless; bland, boring, bad taste; neutral in taste	13
does not contain vitamins	5
there are tastier beverages; other beverages taste better	5
contains too much carbonic acid	3
too expensive	2
causes me to hiccup / to burp up	2
no disadvantages / no answer	13

Note. $N = 40$. Single mentions (i.e., $n = 1$) are omitted. English translation by the present author.

Table C3

Persons or Organizations Approving of Respondents' Drinking Mineral Water (Responses to Question V7)

Response	*n*
partner, girlfriend, boyfriend	6
physician	4
parents	3
family	3
none / no answer	24

Note. $N = 40$. Single mentions (i.e., $n = 1$) are omitted. English translation by the present author.

Table C4

Persons or Organizations Disapproving of Respondents' Drinking Mineral Water (Responses to Question V8)

Response	*n*
persons with whom I go out / to a bar / to a party	8
friends	6
manufacturers of other beverages (e.g., Coca Cola)	2
none / no answer	28

Note. $N = 40$. English translation by the present author.

Table C5

Circumstances That Facilitate Drinking Mineral Water (Responses to Question V9)

Response	*n*
while exercising; after sport / physical exercise	27
during warm / hot weather; in the summer; when being warm	18
at work; when studying / while being at the university	6
when no other (low-calorie) beverages are available	5
when mineral water is instantly available; when it is present in a situation	4
in the evening; at night	4
when having stomach trouble / a bad cold; abroad, when tap water is of poor quality	3
when being alone / not in the company of friends	2
when eating	2
lack of money	2
none / no answer	3

Note. $N = 40$. Single mentions (i.e., $n = 1$) are omitted. English translation by the present author.

Table C6

Circumstances That Impede Drinking Mineral Water (Responses to Question V10)

Response	*n*
when being on a (birthday) party / in a bar	12
when being in the company of friends (e.g., in the evening, at night)	10
during cold weather; in the winter; when being cold	8
when other / better tasting beverages are available	5
when going out at night	4
on the weekend	2
when soda cartridge is empty	2
when boxes with the water bottles need to be carried first	2
when it is not available	2
none / no answer	9

Note. $N = 40$. Single mentions (i.e., $n = 1$) are omitted. English translation by the present author.

APPENDIX D

Further Results From the Quantitative Main Study

Table D1

Intercorrelations for Potential Dependent Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Mineral water intake (raw scores; ml)	-										
2. Mineral water intake (rescaled scores; L) T	.95*	-									
3. Mineral water intake (raw scores; ml) divided by body weight	.98*	.93*	-								
4. Mineral water intake (raw scores; ml) divided by body weight T	.93*	.99*	.94*	-							
5. Total beverage intake (raw scores; ml)	.48*	.44*	.43*	.41*	-						
6. Total beverage intake (rescaled scores; L) T	.48*	.45*	.44*	.42*	.99*	-					
7. Total beverage intake (raw scores; ml) divided by body weight	.39*	.36*	.44*	.40*	.87*	.86*	-				
8. Total beverage intake (raw scores; ml) divided by body weight T	.42*	.39*	.46*	.42*	.87*	.88*	.99*	-			
9. Ratio of mineral water to total beverage intake (raw scores)	.91*	.92*	.91*	.93*	.19*	.20*	.16*	.19*	-		
10. Ratio of mineral water to total beverage intake (raw scores) T	.84*	.95*	.85*	.95*	.18*	.20*	.15	.18*	.95*	-	
11. Relevant set (number of beverages used)	-.30*	-.26*	-.30*	-.26*	.04	.05	.06	.07	-.34*	-.28*	-

Note. N = 179. T = Square-root transformed scores. For an explanation of the variables see chap. 5.2.

* $p < .05$.

Table D2

Intercorrelations for Independent, Person-Related Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Knowledge test	-													
2. FEV scale 1	.07	-												
3. VARSEEK-scale	-.02	-.05	-											
4. FNS	.04	.20*	-.76*	-										
5. IEG scale 1	.06	-.20*	.24*	-.21*	-									
6. Global daily mood	.00	.05	.09	-.17*	.05	-								
7. Global daily physical comfort	.02	.09	.12	-.16*	.10	.67*	-							
8. SES of family of origin	-.02	.07	.08	-.01	.08	.10	.09	-						
9. Participants' personal net income	-.04	-.04	.01	-.10	.10	.06	.05	-.08	-					
10. Participants' personal net income T	-.03	-.03	.00	-.09	.11	.07	.06	-.06	.99*	-				
11. Physical work or labor	.06	-.07	.08	-.10	.11	-.04	-.09	.07	.20*	.20*	-			
12. Physical work or labor T	.02	-.04	.03	-.04	.13	-.06	-.10	.05	.20*	.20*	.93*	-		
13. Physical exercise	.01	.17*	-.02	.07	.01	.11	.09	-.02	-.10	-.09	.07	.10	-	
14. Physical exercise T	-.01	.18*	.01	.06	.03	.12	.10	-.03	-.14	-.13	.03	.07	.93*	-

Note. 169 <= *N* <= 179. T = Square-root transformed scores. For an explanation of the variables see chap. 5.2.

$^{*}p < .05$.

Table D3

Intercorrelations for Direct and Indirect Measures of Subjective Norm

Variable	1	2	3	4	5	6	7
1. Direct measure T2	-						
2. Sum of normative belief strengths BI	.54*	-					
3. Sum of normative belief strengths OS	.54*	1.00*	-				
4. Sum of motivations to comply	.12	.23*	.23*	-			
5. Sum of motivations to comply OS	.12	.23*	.23*	1.00*	-		
6. Sum of products (normative beliefs)	.43*	.79*	.79*	.67*	.67*	-	
7. Sum of products (normative beliefs) OS	.54*	1.00*	1.00*	.22*	.22*	.81*	-

Note. $N = 179$. T2 = Square transformed scores. BI = Bipolarized scores (ranging from -3 to +3). OS = Optimally scaled scores. For an explanation of the variables see chap. 5.4.
* $p < .05$.

Table D4

Intercorrelations for Direct and Indirect Measures of Perceived Behavioral Control

Variable	1	2	3	4	5	6	7
1. Direct measure T2	-						
2. Sum of control belief strengths	.29*	-					
3. Sum of control belief strengths OS	.29*	1.00*	-				
4. Sum of control belief powers BI	.36*	.27*	.27*	-			
5. Sum of control belief powers OS	.36*	.27*	.27*	1.00*	-		
6. Sum of products (control beliefs)	.40*	.38*	.38*	.96*	.96*	-	
7. Sum of products (control beliefs) OS	.43*	.69*	.69*	.85*	.85*	.93*	-

Note. $N = 179$. T2 = Square transformed scores. OS = Optimally scaled scores.
BI = Bipolarized scores (ranging from -3 to +3). For an explanation of the variables see chap. 5.4.
* $p < .05$.

Table D5

Intercorrelations for Direct and Indirect Measures of Attitude Toward Ingesting Mineral Water

Variable	1	2	3	4	5	6	7
1. Direct measure T2	-						
2. Sum of behavioral belief strengths	.50*	-					
3. Sum of behavioral belief strengths OS	.50*	1.00*	-				
4. Sum of outcome evaluations BI	.33*	.37*	.37*	-			
5. Sum of outcome evaluations OS	.33*	.37*	.37*	1.00*	-		
6. Sum of products (behavioral beliefs)	.50*	.60*	.60*	.94*	.94*	-	
7. Sum of products (behavioral beliefs) OS	.65*	.77*	.77*	.50*	.50*	.77*	-

Note. $N = 179$. T2 = Square transformed scores. OS = Optimally scaled scores.
BI = Bipolarized scores (ranging from -3 to +3). For an explanation of the variables see chap. 5.4.
* $p < .05$.

Table D6

Theory of Planned Behavior (TPB):

Input Matrix of Intercorrelations for the Indicators of the Constructs

Variable	1	2	3	4	5	6	7	8
1. Question H10	-							
2. Question H11	.92*	-						
3. Question H12 T	.84*	.85*	-					
4. Question H17, Item 1	.83*	.84*	.85*	-				
5. Attitude toward mineral water intake (direct measure) T2	.63*	.63*	.63*	.69*	-			
6. Subjective norm (direct measure) T2	.26*	.26*	.26*	.32*	.46*	-		
7. Perceived behavioral control (direct measure) T2	.41*	.40*	.39*	.39*	.26*	.08	-	
8. Mineral water intake (rescaled scores; L) T	.72*	.72*	.81*	.74*	.59*	.24*	.38*	-

Note. $N = 179$. T = Square-root transformed scores. T2 = Square transformed scores.

For an explanation of the variables see chap. 5.4.

* $p < .05$.

Table D7

Theory of Planned Behavior (TPB):

Matrix of Standardized Residuals of the Indicators of the Constructs

Variable	1	2	3	4	5	6	7	8
1. Question H10	.00							
2. Question H11	.03	.00						
3. Question H12 T	-.02	-.01	.00					
4. Question H17, Item 1	-.01	-.01	.02	.00				
5. Attitude toward mineral water intake (direct measure) T2	-.02	-.02	.00	.06	.00			
6. Subjective norm (direct measure) T2	-.02	-.01	-.01	.06	.00	.00		
7. Perceived behavioral control (direct measure) T2	.00	-.00	-.00	.00	-.00	-.00	.00	
8. Mineral water intake (rescaled scores; L) T	-.03	-.03	.08	.01	.03	.01	.00	.00

Note. N = 179. T = Square-root transformed scores. T2 = Square transformed scores.
For an explanation of the variables see chap. 5.4.

Table D8

Intercorrelations for the Direct Measure and Indirect, Belief-Based Measures of Attitude Toward Ingesting Mineral Water

Variable	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0. Direct measure (dependent variable) T2	-																				
Beliefs (predictors): (Drinking) mineral water ...[a]																					
1. quenches thirst better than other beverages	.38*	-																			
2. does not make me gain weight	.20*	.08	-																		
3. is neutral in taste	.27*	.14	-.01	-																	
4. is better value for money than many other beverages	.07	.12	.02	.00	-																
5. fosters my health	.60*	.26*	.21*	.15*	.15*	-															
6. is free of calories	.20*	.17*	.51*	.02	.06	.24*	-														
7. supplies my body with many required nutrients	.31*	.10	.08	.12	.10	.33*	-.05	-													
8. keeps me in shape	.46*	.22*	.20*	.17*	.13	.52*	.25*	.48*	-												
9. is refreshing	.45*	.52*	.06	.26*	.16*	.34*	.05	.27*	.38*	-											
10. is free of sugar	.32*	.16*	.46*	.09	-.02	.31*	.52*	.07	.15*	.16*	-										
11. is suitable for use on nearly every occasion	.15*	.15*	.08	.10	-.17*	.06	-.01	.05	.06	.10	.17*	-									
12. is boring	.37*	.31*	.17*	.17*	-.13	.11	-.01	.24*	.25*	.27*	.09	.21*	-								
13. does not contain vitamins	.17*	-.03	-.03	-.01	-.08	-.03	-.04	.23*	.17*	.01	-.01	.04	.14	-							
14. fosters my well-being	.61*	.44*	.21*	.32*	.11	.47*	.16*	.31*	.45*	.48*	.25*	.21*	.31*	-.06	-						
15. does not taste sweet	.21*	.20*	.16*	.20*	-.17*	.25*	.27*	.15*	.23*	.32*	.38*	.21*	.11	.02	.26*	-					
16. does not contain pollutants	.11	.02	.14	-.08	.03	.25*	.29*	.07	.19*	-.08	.17*	.08	.05	-.01	.06	.09	-				
17. is a hygienically clean food product	.02	-.05	.03	-.06	.09	.16*	.03	.09	.10	-.04	.10	-.04	-.03	-.05	.05	.08	.57*	-			
18. is easy to digest	.39*	.34*	.10	.15*	.10	.40*	.16*	.22*	.27*	.29*	.33*	.22*	.13	-.00	.41*	.29*	.23*	.31*	-		
19. does not contain alcohol	.26*	.13	.14	-.01	.07	.28*	.20*	.13	.19*	.07	.32*	.17*	.06	-.14	.20*	.24*	.03	.09	.30*	-	
20. is a high-quality food product	.24*	.14	.08	-.09	-.04	.29*	.14	.28*	.31*	.08	.19*	.01	.18*	.12	.21*	.16*	.35*	.49*	.39*	.17*	-

Note. $N = 179$. T2 = Square transformed scores. Beliefs consist of two optimally scaled elements; for an explanation of the variables see chap. 5.4.

[a]For item wordings in German see Appendix B1, Questions H23 and H24; sequence of items in this table follows the sequence in which they appear at Question H23.

* $p < .05$.

Table D9

Intercorrelations for the Direct Measure and Indirect, Belief-Based Measures of Perceived Behavioral Control

Variable	0	1	2	3	4	5	6	7	8	9	10
0. Direct measure (dependent variable) T2	-										
Beliefs (predictors): Expecting ...[a] for the next 7 days											
1. very warm weather	-.02	-									
2. to be often in the university	.18*	.28*	-								
3. to be frequently in situations where I want to drink a beverage and where I find other beverages to choose from, too, apart from mineral water	.33*	.09	.29*	-							
4. to be often together by friends	.15*	.11	.31*	.26*	-						
5. rather chilly or cold air temperatures	.28*	-.40*	.16*	.37*	.28*	-					
6. to get physical exercise frequently	.15*	.22*	.17*	.17*	.09	.06	-				
7. to have mineral water available whenever and wherever I want to drink a beverage	.48*	.09	.43*	.36*	.32*	.38*	.26*	-			
8. to feel warm frequently	-.02	.52*	.31*	.03	.09	-.08	.18*	.23*	-		
9. to be on many parties	.13	-.11	.14	.14	.58*	.30*	.01	.19*	-.12	-	
10. to have mineral water permanently available in my household	.47*	.10	.20*	.49*	.22*	.38*	.19*	.62*	.19*	.11	-

Note. $N = 179$. T2 = Square transformed scores. Beliefs consist of two optimally scaled elements; for an explanation of the variables see chap. 5.4.

[a]For item wordings in German see Appendix B1, Questions H29 and H30; the sequence of items in this table follows the sequence in which they appear at Question H29.

* $p < .05$.

Table D10

Extension of the Theory of Planned Behavior (TPB): Input Matrix of Intercorrelations for the Indicators of the Constructs

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Question H10	-																	
2. Question H11	.92*	-																
3. Question H12 T	.84*	.85*	-															
4. Question H13	.18*	.15	.19*	-														
5. Question H14 T	.13	.08	.14	.86*	-													
6. Question H15	-.06	-.08	-.08	-.14	-.09	-												
7. Question H16 T	-.08	-.07	-.08	-.10	-.06	.75*	-											
8. Question H17, Item 1	.83*	.84*	.85*	.21*	.15	-.09	-.07	-										
9. Question H17, Item 2	.06	.02	.09	.80*	.76*	-.15*	-.11	.10	-									
10. Question H17, Item 3	-.10	-.10	-.12	-.07	.02	.62*	.70*	-.08	.01	-								
11. Attitude toward mineral water intake (direct measure) T2	.63*	.63*	.63*	.07	.03	-.09	-.01	.69*	.04	-.01	-							
12. Attitude toward getting physical exercise (direct measure) T2	.09	.10	.18*	.34*	.35*	-.06	.04	.20*	.40*	.05	.23*	-						
13. Subjective norm(direct measure) T2	.26*	.26*	.26*	.06	.04	.01	.03	.32*	.02	.05	.46*	.11	-					
14. Perceived behavioral control (direct measure) T2	.41*	.40*	.39*	.10	.05	-.01	-.00	.39*	.10	-.02	.26*	.17*	.08	-				
15. Time spent on physical work or labor (hrs / day) T	-.00	-.02	-.02	.04	.13	.57*	.75*	-.07	-.01	.57*	.02	.01	.02	-.03	-			
16. Time spent on physical exercise (hrs / day) T	.09	.07	.13	.65*	.64*	-.12	-.03	.17*	.64*	.03	.06	.31*	-.03	.14	.07	-		
17. Sum of minimum and maximum temperature (°C)	.01	-.01	-.04	.00	.03	.13	-.03	.02	.03	.08	.04	.05	.20*	-.07	.03	-.01	-	
18. Mineral water intake (rescaled scores; L) T	.72*	.72*	.81*	.21*	.17*	-.08	-.08	.74*	.11	-.08	.59*	.24*	.24*	.38*	-.01	.21*	-.03	-

Note. $N = 179$. T = Square-root transformed scores. T2 = Square transformed scores. For an explanation of the variables see chap. 5.4.

$^{*}p < .05$.

Table D11

Extension of the Theory of Planned Behavior (TPB): Matrix of Standardized Residuals of the Indicators of the Constructs

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Question H10	.02																	
2. Question H11	.06	.02																
3. Question H12 T	.00	.01	.02															
4. Question H13	.07	.03	.08	.01														
5. Question H14 T	.02	-.03	.03	.02	.01													
6. Question H15	-.01	-.03	-.03	-.14	-.09	-.00												
7. Question H16 T	-.02	-.01	-.02	-.10	-.06	-.00	-.00											
8. Question H17, Item 1	.01	.01	.04	.10	.04	-.04	-.01	.02										
9. Question H17, Item 2	-.04	-.08	-.01	.01	-.00	-.15	-.11	-.00	.01									
10. Question H17, Item 3	-.05	-.05	-.07	-.07	.02	.05	-.01	-.03	.01	-.00								
11. Attitude toward mineral water intake (direct measure) T2	.00	.00	.02	.02	-.02	-.09	-.01	.08	-.01	-.01	.03							
12. Attitude toward getting physical exercise (direct measure) T2	-.03	-.02	.07	-.02	.00	-.06	.04	.09	.07	.05	.10	.00						
13. Subjective norm(direct measure) T2	-.00	-.00	-.00	.06	.04	.01	.03	.07	.02	.05	.02	.11	.00					
14. Perceived behavioral control (direct measure) T2	.03	.02	.02	.10	.05	-.01	-.00	.02	.10	-.02	.02	.17	.00	-.00				
15. Time spent on physical work or labor (hrs / day) T	.05	.03	.03	.04	.13	-.03	.01	-.02	-.01	-.00	.02	.01	.02	-.03	-.00			
16. Time spent on physical exercise (hrs / day) T	.01	-.01	.05	.01	.02	-.12	-.03	.09	.06	.03	.02	.04	-.03	.14	.07	.02		
17. Sum of minimum and maximum temperature (°C)	.01	-.01	-.04	.00	.03	.13	-.03	.02	.03	.08	.04	.05	.20	-.07	.03	-.01	.00	
18. Mineral water intake (rescaled scores; L) T	-.01	-.01	.10	.04	-.00	-.03	-.03	.04	-.04	-.04	.06	.11	.02	.03	.03	.08	-.01	.02

Note. $N = 179$. T = Square-root transformed scores. T2 = Square transformed scores. For an explanation of the variables see chap. 5.4.

Table D12

Intercorrelations for the Components in Pudel and Westenhöfer's Model (PWM)

Variable	1	2	3	4	5	6	7
1. Mineral water intake (rescaled scores; L) T	-						
2. Sum of image components BI	.32*	-					
3. Sum of image components OS	.32*	1.00*	-				
4. Sum of attributes of the evaluation of the situation	.21*	.46*	.46*	-			
5. Sum of attributes of the evaluation of the situation OS	.21*	.46*	.46*	1.00*	-		
6. Sum of products	.38*	.89*	.89*	.73*	.73*	-	
7. Sum of products OS	.40*	.80*	.80*	.52*	.52*	.93*	-

Note. $N = 179$. T = Square-root transformed scores. BI = Bipolarized scores (ranging from -3 to +3). OS = Optimally scaled scores. For an explanation of the variables see chap. 5.4.

* $p < .05$.

Table D13

Intercorrelations for Volume of Mineral Water Intake and Weighted Image Components in Pudel and Westenhöfer's Model (PWM)

Variable	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0. Mineral water intake (rescaled scores; L) T	-																				
Weighted image components (predictors): (Drinking) mineral water ...[a]																					
1. quenches thirst better than other beverages	.32*	-																			
2. does not make me gain weight	.12	.04	-																		
3. is neutral in taste	.13	.17*	.01	-																	
4. is better value for money than many other beverages	.17*	.17*	.08	.05	-																
5. fosters my health	.39*	.32*	.34*	.17*	.19*	-															
6. is free of calories	.24*	.11	.63*	.11	.00	.33*	-														
7. supplies my body with many required nutrients	.10	.15*	.07	.00	.13	.38*	.10	-													
8. keeps me in shape	.33*	.28*	.25*	.19*	.12	.53*	.26*	.35*	-												
9. is refreshing	.38*	.54*	.14	.19*	.20*	.38*	.12	.28*	.37*	-											
10. is free of sugar	.26*	.23*	.46*	-.01	-.04	.34*	.59*	.17*	.26*	.20*	-										
11. is suitable for use on nearly every occasion	.09	.18*	.06	.05	-.04	.15	.09	.06	.07	.10	.18*	-									
12. is boring	.12	.14	-.06	.13	.04	.13	-.02	.04	.06	.13	.12	.04	-								
13. does not contain vitamins	-.01	.06	.08	.01	.01	-.00	-.00	-.11	-.10	.01	.13	-.09	.00	-							
14. fosters my well-being	.43*	.47*	.23*	.18*	.16*	.52*	.15*	.26*	.42*	.47*	.36*	.15*	.15	.08	-						
15. does not taste sweet	.05	.10	.05	.24*	.03	.17*	.22*	.06	-.01	.14	.25*	.07	.06	.08	.14	-					
16. does not contain pollutants	-.04	-.02	.21*	-.04	-.00	.24*	.30*	.06	.18*	-.07	.13	-.03	-.02	-.05	.03	-.01	-				
17. is a hygienically clean food product	-.06	-.04	.02	-.01	.06	.11	.09	.11	.06	-.04	.05	-.10	.00	-.02	.01	.03	.52*	-			
18. is easy to digest	.30*	.30*	.05	.08	.18*	.34*	.20*	.12	.15*	.23*	.30*	.16*	.16*	-.09	.37*	.23*	.23*	.28*	-		
19. does not contain alcohol	.09	.13	.23*	.07	.03	.28*	.17*	.14	.17*	.11	.26*	.08	.07	.04	.13	.06	.05	.07	.16*	-	
20. is a high-quality food product	.11	.13	.10	-.03	-.02	.36*	.19*	.32*	.20*	.09	.25*	-.03	.10	-.05	.15*	.05	.34*	.42*	.39*	.23*	-

Note. $N = 179$. T = Square-root transformed scores. Weighted image components consist of two optimally scaled elements; for an explanation of the variables see chap. 5.4.

[a]For item wordings in German see Appendix B1, Questions H23 and H25; sequence of items in this table follows the sequence in which they appear at Question H23.

* $p < .05$.