

Chapter: **The Role of Attitudes in Diet, Eating, and Body Weight**

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Eating is essential to our ability to live. Just like breathing, humans need to eat. But unlike breathing, eating serves purposes beyond the satisfaction of physiological needs. Eating means also pleasure, expression of cultural, religious, or political values, the appreciation of the fellowship of other diners, and – for most people – *the* recurrent activity that promotes the spending of time with family, friends, and colleagues (e.g., Larson, Nelson, Neumark-Sztainer, Story, & Hannan, 2009, Sobal & Nelson, 2003). The goal of this chapter is to explore and describe the role of attitudes for dietary choices, eating behaviors, and a key health consequence that is tightly intertwined with diet and eating, body weight.

Definitions of diet, eating, and body weight

Attitudes are here conceptualized as evaluations or assignments of positive or negative valence to some entity. Furthermore, we use the following definitions for diet, eating, and body weight:

Diet is the term to describe food choice in general as well as nutritional quality of the foods that people consume, often also described as healthy or unhealthy diet or specific diet styles such as Western diet or Mediterranean diet. Diet is usually operationalized as the degree of adherence to certain dietary recommendations, for example, concerning daily calorie consumption (e.g., CDC, 2012) or necessary nutrients (e.g., vitamins, calcium), or following certain dietary patterns (e.g., Western or Mediterranean diet). Because measurement of diet is error-prone (e.g., Archer, Hand, & Blair, 2013; Huang, Roberts, Howarth, & McCrory, 2005; Subar et al., 2003) and time-consuming, many studies assess proxies of a healthy diet, such as portions of fruits and vegetables.

Eating describes behavioral facets such as eating rate (Andrade, Greene, & Melanson, 2008), emotional eating (van Strien, Frijters, Bergers, & Defares, 1986), or family mealtime practices (e.g., Dallacker, Hertwig, & Mata, 2017). Further, it can also refer to social, environment, or other circumstantial factors in the context of a meal setting such as eating at a specific time of day, particularly place, or special occasion. Eating behavior is usually measured using questionnaires (e.g.,

Three Factor Eating Questionnaire, Stunkard & Messick, 1985; the Dutch Eating Behavior Questionnaire, van Strien et al., 1986), experience sampling (e.g., binge episodes, Munsch, Meyer, Quartier, & Wilhelm, 2012), or observation (e.g., Andrade et al., 2008).

Body weight refers to a person's weight, often quantified using the Body Mass Index (BMI), which puts body weight in relation to a person's height ($BMI = \text{kg} / \text{m}^2$). BMI classifications include underweight ($BMI < 18.5 \text{ kg/m}^2$), normal weight ($BMI > 18.5$ and $\leq 24.9 \text{ kg/m}^2$), overweight ($BMI \geq 25.0$ and $\leq 29.9 \text{ kg/m}^2$), and obesity ($BMI \geq 30 \text{ kg/m}^2$; World Health Organization, 2017). BMI is often criticized for not differentiating between muscle and fat mass (e.g., athletes often have a BMI in the overweight range, because they have more muscles and muscles are heavier than fat; e.g., Nevill, Winter, Ingham, Watts, Metsios, & Stewart, 2010). Some research suggests that other indicators of body mass or body composition, such as waist circumference, make better predictions about health risks than BMI alone (Janssen, Katzmarzyk, & Ross, 2004). At the same time, BMI highly correlates with actual adiposity and is a better estimator of body fat than many other indices, such as the body adiposity index (e.g., Geliebter, Atalayer, Flancbaum, & Gibson, 2013). Importantly, BMI is very easy to measure and is the most commonly reported unit to describe weight status of participants, particularly in epidemiological research. The biological cause of overweight and obesity is an energy imbalance between calories consumed and calories expended. One of the two key levers to fight the obesity epidemic is therefore the number of daily calories consumed (determined by diet quality such as energy density of foods consumed and eating behaviors such as binge eating or eating rate).

In a nutshell, the difference between diet and eating attitudes is that diet attitudes are attitudes pertaining to *what* people eat, and eating attitudes are attitudes towards *how* people eat. Attitudes towards body weight describe attitudes towards consequences of diet and eating behavior. Let us illustrate the difference between the three terms with two examples:

- (1) In binge drinking, diet would be the type and nutritional value of the beverage(s), behavior would describe the binging aspect (i.e., drink more beverage in a given time period that is considerably shorter than the time most people would take to drink a similar amount) and also the situation such as being with friends. Body weight would describe the result of a potential energy surplus from binge drinking. Therefore, attitudes towards binge

drinking in general could be assessed as well as attitudes towards alcoholic beverages, binge drinking, or weight gain as a result of regular binge drinking.

(2) Similarly, the French Paradox—the epidemiological observation, that French citizens have a lower rate of coronary heart disease, than, for example, US citizens, notwithstanding a diet that is comparatively high in saturated fats—has been described in terms of diet quality (high amounts of saturated fat, as in cheese), in terms of eating behavior (length of meals; Rozin, Kabnick, Pete, Fischler, & Shields, 2003), and in terms of body weight (lower in France than in most other countries in Europe; Eurostat, 2015). Again, attitudes could be broken down in attitudes about diet, that is, French foods or attitudes about foods high in saturated fat; attitudes about eating, such as meal duration; and attitudes about body weight caused by foods high in saturated fat and long meal durations.

Why care about attitudes in the domains of diet, eating, and body weight?

Attitudes on diet, eating, and body weight are integral to most psychological models that aim to predict health behaviors and health behavior change: Out of ten popular theories in a recent meta-analysis on changing socio-cognitive factors and their effects on health-related intentions and behaviors, each one included attitude as a predictor (Sheeran et al., 2016). Attitudes in this meta-analysis were defined as “people’s evaluation of the consequences of performing health behaviors” [p.1180] and this definition also encompassed conceptually similar constructs such as costs and benefits, outcome expectancies, or response efficacy. The other two social-cognitive factors, examined in this meta-analysis—norms and self-efficacy—were represented less often, namely in six and in eight of the examined theories, respectively.

Attitudes, however, are not soloists but team players. No theory on health behavior suggests attitudes to suffice to predict health behaviors in general, or diet, eating, and body weight in particular (e.g., Bandura, 2004; Sheeran et al., 2016). Many theories applied in research on behavior change for diet, eating, and body weight postulate additional socio-cognitive factors (e.g., norms, self-efficacy, risk perception), motivational factors or intentions (e.g., Theory of Planned Behavior, Ajzen, 1991; Ajzen & Fishbein, 1980; Socio-Cognitive Theory; e.g., Bandura, 2001), and volitional factors (e.g., Health Action Process Approach; Schwarzer, 1992; 2011). Other theories applied successfully in the

context of health behavior change skip attitudes altogether, for example, Self-Determination Theory (Deci & Ryan, 2008; Silva et al., 2011; Teixeira et al., 2010).

According to many models, attitudes influence intentions or motives; they, in turn, influence behaviors (e.g., Ajzen, 1991; Ajzen & Fishbein, 1980; see Ajzen, Fishbein, Lohmann, & Albarracín, Volume I of this handbook, for in depth coverage on these issues). For example, a positive attitude towards healthy nutrition boosts a person's intention to eat more vegetables, which, in turn, may boost the behavior of consuming vegetables. For attitudes to predict behaviors, it helps to measure attitudes and behaviors on the same level of specificity: Attitudes pertaining specifically to the consumption of fruit and vegetables best predict their consumption but not the consumptions of other healthy foods ("corresponding principle"). General attitudes, in contrast, best predict aggregate behaviors: Attitude towards healthy nutrition best predicts behavior measures aggregating the consumption of different healthy foods such as fruits and vegetables, low salt and low sugar consumption or home-made foods (see Vogel & Wänke, 2016).

Meta-analyses suggest that attitudes causally influence intentions and behaviors, even though the causal link is of medium-sized effects concerning intention and small- to medium-sized effects concerning diet-relevant behaviors (McDermott et al., 2015; Sheeran et al., 2016). The observation that the link between attitudes and a behavior is indeed often only small in magnitude has been termed the "attitude-behavior gap" (e.g., LaPiere, 1934 for a first description of this gap). Focusing on the context of diet, eating, and body weight what could explain attitude-behavior gaps? Diet, eating, and body weight are complex phenomena shaped by multiple factors. Next to the aforementioned socio-cognitive, motivational, and volitional factors at least three other factors make an important contribution: (1) Genetic factors, for example, influence an individual's strength of preference for sweet or fatty foods (Mennella & Bobowski, 2015), or body weight (Llewellyn & Wardle, 2015). (2) Social factors, namely, the high prevalence of eating in company (e.g., social modeling, social norms or social facilitation; Herman, Polivy, & Roth, 2003; Herman, 2015 for reviews). Finally, (3) environment factors, which are assumed to have great influence on diet (e.g., omnipresence of energy dense and highly palatable foods; Hill & Peters, 1998) and eating behavior (e.g., grazing and snacking instead of meals; Bellisle, 2014); they, in turn, determine body weight (e.g., Mayne, Auchincloss, &

Michael, 2015 for a review, but see also Cobb, et al., 2015). Thus, theories that primarily bet on individual factors (such as cognitive, motivational, or volitional factors) to explain diet, eating, and body weight will be doomed to only explain a small proportion of the variance in behavior.

How are attitudes typically measured in the domain of diet, eating, and body weight?

Previous research has distinguished between *implicit* and *explicit* attitudes. It is assumed that implicit and explicit attitudes steer behavior in two different ways: Explicit attitudes do so through deliberate analysis of the costs and the benefits of a behavior; implicit attitudes do so through a more spontaneous and affective manner and their influence sidesteps deliberation (see Gawronski, Volume I of this handbook, for a deep coverage of these issues). This distinction has wide-ranging consequences not only for attitude measurement but also for theorizing and testing of the link between attitudes and other cognitions, motivations, affect, and behaviors (e.g., Ayres, Conner, Prestwich, & Smith, 2012; Conner, Perugini, O’Gorman, Ayres, & Prestwich, 2007). Attitudes about diet, eating, and body weight are typically measured explicitly, using questionnaires. Implicit attitudes are preferentially measured with reaction time paradigms such as the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) or evaluative priming measures (Fazio, Jackson, Dunton, & Williams, 1995). Explicit and implicit attitudes are not mutually exclusive, but rather complement each other. For example, implicit attitudes can provide incremental validity for food choice and consumption above and beyond explicit attitudes (Frieze, Hofmann, & Wänke, 2008).

Following Rosenberg and Hovland (1960), some researchers have further broken down explicit attitude measures into cognitive versus affective attitudes towards health behaviors (Lawton, Conner, & McEachan, 2009). Cognitive attitudes about health behaviors meant asking people how harmful or beneficial a behavior would be. Their affective attitudes were probed by asking how (not) enjoyable this behavior would be. An affective attitude has been shown to be a stronger predictor of nine different health behaviors than cognitive attitudes (Lawton et al., 2009). One could argue that both, cognitive and affective attitudes, are explicit measures that require deliberate processing to indicate an answer in a questionnaire.

Often, explicit and implicit attitude measures are used in the same study. It is assumed that explicit and implicit attitudes differ because implicit attitudes might be less influenced by social norms

or social desirability. For example, Craeynest and colleagues hypothesized that children with obesity and children with normal weight will both express a preference of healthy foods in response to an explicit measure. Yet, obese children will reveal a more positive attitude towards unhealthy foods in response to the implicit test (Craeynest et al., 2005). However, they did not find such differences in attitudes. Potential explanations for this finding include that (a) social desirability does not moderate the relation between explicit and implicit attitude measures (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005), (b) just like adults, many obese children may wish to reduce their body mass index and attempt controlling their diet by eating more healthy foods (e.g., Santos, Sniehotka, Marques, Carraça, & Teixeira, 2017), and thus, it is not clear why they should show an implicit negative attitude towards healthy foods, and (c) as described above, food choice and diet is a highly complex phenomenon, determined by a combination of individual, social, environmental, and genetic factors, and thus, the effects of attitude for explaining obesity may simply be small. Further, this finding is in line with others showing that explicit and implicit attitudes do not systematically differ. Rather, there is a small but significant correlation between implicitly measured attitudes and explicit attitudes using self-report (Hofmann et al., 2005).

Below we present a selection of instruments that are used to measure attitudes in the domains of diet, eating, and body weight. Although these instruments can only be an excerpt of the available scales, two things are particularly noticeable: Many more scales seem to be available concerning attitudes towards diet in general or specific foods than scales on attitudes about eating behavior or body weight. Second, while a variety of different explicit measures are used; the vast majority of research on implicit attitude measures uses the Implicit Association Test to probe implicit attitudes about mostly diet or body weight. Importantly, it would be helpful to have more coherent definitions of attitudes in the domains of diet, eating, and body weight. They, in turn, could result in more standardized attitude measurements concerning these topics, tests of convergence across measures, and systematic reviews (see also DeHouwer, 2008, for similar conclusions).

Examples for popular *explicit questionnaire measures* in the context of diet, eating, and body weight are shown in Table 1:

Table 1. Examples of popular attitude questionnaires on diet, eating, and bodyweight.

Topic/ Subtopic	Name of questionnaire	Description of questionnaire	Reference
<i>Diet</i>			
<i>Healthy eating, food, nutrition</i>			
	Food and nutrition-related attitudes	Subscales differentiate attitudes into social-adventuresome, frugal-utilitarian, qualitative-pleasurable, nutritious-healthy	Axelsson & Penfield, 1983
	Health and Taste Attitude Scales (HTAS)	Subscales differentiate general health interest, light product interest, natural product interest, craving for sweet foods, using food as reward, pleasure	Roininen, Lähteenmäki, & Tuorila, 1999
	Nutrition Attitude Instrument	Subscales differentiate caring about nutrition, eating new foods, nutrition effects on health, learning about nutrition	Byrd-Bredbenner, O'Connell, Shannon, & Eddy, 1984
	Nutrition Attitude Survey	Subscales differentiate attitudes into helpless and unhealthy, food exploration, meat preference, health consciousness	Hollis, Carmody, Connor, Fey, & Matarazzo, 1986
<i>Organic foods</i>			
	Organic Product Attitudes	Nine items covering different attitudes towards organic products, including health benefit, quality, fraud, taste, price, attractiveness, fashion	Gil, Gracia, & Sánchez, 2000
<i>Genetically modified foods</i>			
	Attitudes towards genetically modified foods	Nine items assessing attitudes towards genetically modified foods	Magnusson & Hursti, 2002
<i>Chocolate</i>			
	Attitudes to Chocolate Questionnaire	Subscales differentiate cravings (preoccupation with chocolate) and guilt (negative affect following chocolate consumption)	Benton, Greenfield, & Morgan, 1998; Cramer & Hartleib, 2001
<i>Functional foods</i>			
	Attitudes Towards Functional Foods	Subscales differentiate reward from using functional foods, confidence in functional foods, necessity for functional foods, functional foods as medicine, functional foods as part of a healthy diet, absence of nutritional risk in functional foods, taste of functional foods	Urala & Lähteenmäki, 2004

Topic/ Subtopic	Name of questionnaire	Description of questionnaire	Reference
<i>Meat, vegetarianism</i>			
	Attitude to Red Meat Questionnaire (ARMQ)	Subscales differentiate attitude dimensions of affordability-convenience, safety concern, organoleptic consequences	Worsley & Skrzypiec, 1998
	Attitudes Towards Meat-Eating	12-item scale on meat-eating; originally used to differentiate gender-specific attitudes	Kubberød, Ueland, Rødbotten, Westad, & Risvik, 2002
	Vegetarianism Questionnaire (VEQ)	Subscales differentiate attitudes about meat acceptance, meat production is bad, meat is hard to avoid, pro-vegetarian influences, pro-meat influences	Worsley & Skrzypiec, 1998
<i>Eating behavior</i>			
<i>Children</i>			
	Children's Eating Attitudes Test (ChEAT)	Subscales differentiate dieting, bulimia and food preoccupation, oral control	Kelly, Ricciardelli, & Clarke, 1999; Maloney, McGuire, & Daniels, 1988; Smolak & Levine, 1994
<i>Symptoms of disordered eating</i>			
	Eating Attitudes Test (EAT)	Subscales differentiate dieting, bulimia and food preoccupation, oral control	Garner & Garfinkel, 1979
<i>Body weight/ Overweight</i>			
<i>Weight stigma/ Anti-fat attitudes</i>			
	Anti-Fat Attitudes Questionnaire	Subscales differentiate dislike of fat people, fear of fat, willpower	Crandall, 1994
	Anti-Fat Attitudes Scale (AFAS)	Subscales differentiate social/character disparagement, physical/romantic unattractiveness, weight control/ blame	Lewis, Cash, Jacobi, & Bubb-Lewis, 1997
	Body Attitudes Questionnaire (BAQ)	Subscales differentiate feeling fat, body disparagement, strength and fitness, salience of weight and shape, attractiveness, lower body fatness	Ben-Tovim & Walker, 1991
	Fat Phobia Scale (short form)	Based on one factor of the original long scale, examines attitudes towards people with obesity as undisciplined, inactive and unappealing	Bacon, Scheltema, & Robinson, 2001

The most commonly used *implicit measurement test* is the Implicit Association Test (IAT). This test has been used in most studies testing implicit attitudes about diet, eating, and body weight. At least one study (Craeynest et al., 2005) also used a variant of the Extrinsic Affective Simon Task (EAST, De Houwer, 2003). Other studies have used evaluative priming tasks to assess implicit attitudes towards overweight individuals (e.g., Bessenoff & Sherman, 2000).

In a nutshell, the explicit measurement of attitudes currently prevails. Implicitly measured attitudes may have incremental value for the prediction of eating, particularly impulsive eating. Importantly, implicit attitudes are often not clearly defined. In current research, explicit measurements more precisely capture refined theoretical constructs (i.e., attitudes towards dieting, eating, weight); however, also for explicit measurement more coherent definitions of *attitude* and standardized measures would be important for moving the field forward.

Which factors shape attitudes about diet, eating, and body weight?

Biological bases

Attitude formation depends on a variety of factors including its biological roots, personal experience and social transmission (e.g., Vogel & Wänke, 2016). Although the biological foundation is mostly neglected in general attitude research, this component has received much attention in the domain of nutrition-related attitudes. In fact, it is by reference to the biological basis that researchers and professionals explain many phenomena related to dieting. Evolutionary biology in particular has been applied to explain universal hard-wired preferences towards diets (e.g., the liking for sweet taste and disliking for bitter food; e.g., Mennella & Bobowski, 2015). Such hard-wired preferences had an adaptive value for our ancestors. However, the longing for fat, salt, and sugar in particular became dysfunctional in an obesogenic environment. Whereas bitterness aversion is still useful to avoid toxic alkaloids, positive attitudes towards, for instance, sweet foods are problematic: The high calorie intake associated with sugar content was adaptive in times when food was scarce. And food scarcity has been a fact of life for most of human history. Yet, it has become maladaptive in an industrialized, world in which scarcity has been defeated in many parts of the world, and in which added sugar has become an ubiquitous and often hidden component of our food. For example in the US, per capita sugar

consumption has increased from an average 6 pounds a year in 1822 (about 2.7 kg; Cross & Proctor, 2014) to about 32 kg a year for an average adult man and 23 kg for an average woman in the USA between 2005 and 2010 (Ervin & Ogden, 2013). Several meta-analyses show that higher consumption of sugar (including sugar-sweetened beverages) leads to significant weight gain in children and adolescents (Malik, Pan, Willett, & Hu, 2013; Te Morenga, Mallard, & Mann, 2013). So far, there is no remedy – on the contrary, obesity will likely rise further over the next decades (e.g., Kelly, Yang, Chen, Reynolds, & He, 2008; Westphal & Doblhammer, 2014). Westernization and globalization seem to be lockstep with obesogenic environments with severe consequences: Due to the high obesity levels, the small but steady increase in life expectancy over the last thousand years could come to a halt or may even decline for children born in the USA today (Olshansky et al., 2005).

The role of experiences

The relation between the biological basis of attitudes and development of specific attitudes is not necessarily direct, but may be influenced by experiences (i.e., the consumption of milk is rewarding in lactose tolerant persons but unpleasant and harmful in lactose intolerants). Indeed, the question of how attitudes are shaped by experience over the life course has received increased attention in research. Two prominent experience-based mechanisms in attitude formation are mere exposure and evaluative conditioning (e.g., De Houwer, 2007, 2009). Mere exposure (Zajonc, 1968) refers to more positive attitudes in the wake of repeated exposition towards an attitude object, such as a certain food. Today there is no doubt that food exposure increases the liking for food (e.g., Hill, 1978; Eertmans, Baeyens, & Van den Bergh, 2001). For instance, early experimental studies indicate that the liking for a juice increases with consumptions (Pliner, 1982). Similarly, the repeated consumption of unsalted food can help to attenuate the preference for salty food (Methven, Langrenney, & Prescott, 2012). It appears that mere exposure can also explain the change in hard-wired attitudes. Children tend to avoid vegetables due to their relatively bitter, unsweet taste. However, children who start sampling vegetables at an earlier stage show more positive attitudes toward vegetables than their counterparts who start at a later stage of complementary feeding (Hetherington et al., 2015). Similarly, the consumption of bitter vegetables (spinach and endives) increased their future intake in a sample of toddlers. Yet, in the latter study, food exposure did not suffice to alter the attitude. Attitudes towards

specific foods became more positive when the food had been prepared to provide sufficient calorie intake. That is, it was important that toddlers learned an association between the food and a positive outcome. Theoretically, this phenomenon can be conceived as a case of evaluative conditioning (e.g., DeHouwer, 2009). According to evaluative conditioning, the liking for food should change after it has been paired with some positive or negative stimulus. For instance, consumers repeatedly exposed to images of high-dense snack foods together with images displaying aversive health consequences developed more negative attitudes towards snack food, and accordingly were more likely to choose fruits over snacks (Hollands, Prestwich, & Marteau, 2011). Also, presenting novel foods in a positive mealtime context has been shown to increase liking for these foods (Birch, 1998). Therefore, intervention programs could aim at familiarizing children with healthy diets, and also try to combine these diets with rewarding experiences or positive mealtime atmosphere in order to create healthy food attitudes. Likewise, it underlines the responsibilities of nutritional gatekeepers such as parents, and the social environment in general, including for example kindergarten teachers, in shaping food attitudes.

Social and cultural influences

Parents and friends influence nutrition attitudes by means of social influence. For one, parents and friends establish or strengthen moral standards (e.g., an injunctive norm according to which meat consumption is unacceptable), and they also act as social role models (e.g., establish a descriptive norm by consuming meat; cf. Cialdini, 2003 for injunctive vs. descriptive norms). Along the same lines, some research has suggested that obesity spreads in networks (e.g., Ashrafian, Toma, Harling, Athanasiou, & Darzi, 2014; Christakis & Fowler, 2007), which may in part be attitudinally driven by a desire to act similarly to other proximate members of the network. Empirically, social influences have been found for attitudes on diet, eating, and body weight. For example, young women's dieting behavior (e.g., daily fruit consumption) can be predicted from the health promoting attitudes held by significant others (Berge, MacLehose, Eisenberg, Lase, & Neumark-Sztainer, 2012). Or as summarized by Rodgers and Chabrol (2009), children's attitudes towards eating and body weight depend on the social standards endorsed and communicated by their parents. As is implied by the latter finding, as children are influenced by their parents and friends, while parents and friends are

influenced by societal norms established in different religious (Stevenson, 2017) and cultural groups (Rodriguez-Arauz, Ramirez-Esparanze, & Smith-Castro, 2016).

More generally, individuals with different ethnic or cultural background differ in their attitudes towards diet, eating, and body weight/ body image. For example concerning attitudes towards *diets*, Rozin and colleagues (1999) showed that French and Belgians had the most hedonistic attitudes towards foods whereas US-Americans associated food with the least pleasure, but most healthfulness instead. Similarly, US-Americans also show more negative attitudes towards fat in foods than persons from France and India (Rozin et al., 2002). Concerning *eating behavior*, cultural differences have been reported in feeding styles of parents. For example, South Asian and Black Afro-Caribbean parents exercise greater pressure to eat than White British parents (Gu, Warkentin, Mais, & Carnell, 2017). Other studies have investigated ethnic differences around family meals in the USA. For example, African-American families were more likely to restrict and reward with desserts, whereas Hispanic families consumed more family meals together and less meals in front of the television (Skala, et al., 2012). Similarly, Fulkerson and colleagues (2010) reported that while African American adolescents reported significantly fewer family dinners than white or Latino adolescents, they also reported higher levels of communication at family dinners. Concerning *body weight*, two meta-analyses have shown that white women have a small, but significantly higher dissatisfaction with their body than women of color (Grabe & Hyde, 2006; Roberts, Cash, Feingold, & Johnson, 2006). Along these lines, Costa Ricans were significantly less concerned about gaining weight and view foods less negatively than European Americans (Rodriguez-Arauz et al., 2016). Interestingly, while African-American women, when using explicit measures, reported higher acceptance of larger figures than white women, both ethnic groups showed similar anti-fat biases using implicit measures (Hart, Sbrocco, & Carter, 2016). These examples only give a first glimpse of the role of culture in shaping attitudes towards diet, eating, and body weight. In fact, the link between culture, food, and eating is so strong that if one had only a single question to find out which culture a person belongs to, Rozin recommends to ask about eating habits (Rozin & Vollmecke, 1986). Generally, there is a large need for more systematic cross-cultural studies on attitudes towards diet, eating, and body weight. Currently, there is a dearth of systematic reviews and meta-analyses considering cultural influences on these important topics.

Mass Media

Children and parents are affected by attitudes conveyed in the mass media (see also Johnson, Wolf, & Maio, Volume I of this handbook for the influence of persuasive communication on attitudes). A large body of research investigated how attitudes towards diet, eating, and weight are affected by mass media communication, though from different theoretical angles. Starting from an applied perspective, researchers analyze contemporary media (e.g., advertising and movie content), and study their effects on food preference or body image. In this vein, a plethora of studies have examined adverse effects of slimness ideals on attitudes towards the own body. As can be expected from the aforementioned processes, the enormous exposure to slim and even underweight models establishes slimness as beauty standard. At the same time, this exposure can lead to negative attitudes towards the own physical appearance for those who deviate from the standard. Despite some moderators of this effect (e.g., some people's self-evaluation is less dependent on social standards; Patrick, Neighbors, & Knee, 2004; see also Briñol & Petty, Volume I of this handbook for individual differences in attitudes), meta-analyses indicate that media content has a measurable influence of beauty standards and attitudes towards the self, with pertinent consequences including vulnerability to eating disorders (Hausenblas et al, 2013). Mass media can also shape diet related attitudes. Food marketing targeting children and adolescents have been shown to influence their food choices and purchase requests (Coon, & Tucker, 2002). In an experimental field study during a two weeks summer camp, children were either daily exposed to candy advertisement, fruit advertisement, or no advertisement. Results showed that children in the candy commercial condition eat significantly less fruit than children in the fruit condition (Gorn & Goldberg, 1982). Because children are recognized as a major market force by the food and beverage industry, many countries are currently working on laws aiming at restricting food marketing directed at children (Raine et al., 2013).

Many novel approaches are rather eclectic and combine media and persuasion research (e.g., Green & Dill, 2013). For instance, persuasive attempts aiming at health promotion are deliberately embedded in an entertainment context—a strategy known as *edutainment* (Pechmann & Wang, 2006). Attesting to its effectiveness, popular protagonists endorsing healthy behaviors work as a role model, too, and affect attitudes towards eating in the receiver (Charry, 2014).

Taken together, there is ample evidence for intra- and inter-individual processes, which jointly determine attitudes toward diet, eating behavior, and body weight. While they paint a coherent picture, recommending how to influence attitudes in a strategic way, they also point to the fact that societal, hard-to-control trends have an impact. Lastly, it has to be said that many risk-populations will be resistant to desired attitude change. As follows from various studies on attitude functions (e.g., Katz, 2008) and consistency motives (e.g., Festinger, 1957), people may maintain maladaptive attitudes in order to maintain a positive self-view. Thus, overweight and failed restraining attempts (e.g., Kirk & Hill, 1997) can result in positive weight and negative dieting attitudes including strategic information avoidance in order to reduce dissonance with other conflicting cognitions.

The role of attitudes for diet-, eating-, and body weight-related behaviors

In psychological models on predicting health behavior or health behavior change, there is a graphical cue to how closely variables are related. The outcome (occurrence of a behavior or behavior change) is usually on the far right side of the model, whereas the most distal predictors are on the far left side of the model. The closer predictors are drawn to the right side of the model (where the outcome is), the more direct their impact on the behavior is assumed to be. Attitudes are traditionally on the far left side of these models (e.g., Theory of Planned Behavior; Ajzen, 1991; Ajzen & Fishbein, 1980; see also chapter by Ajzen et al. in Volume I of this handbook). That is, they are more often assumed to be a necessary pre-condition of behavior or behavior change, for example, by influencing intentions, rather than directly shaping behaviors. Numerous studies are interested in attitudes per se, for example, in different groups such as liberal or conservatives, men or women, vegetarians versus omnivores, and not necessarily in their predictive validity for behaviors. This is in line with results from recent meta-analyses (e.g., Sheeran et al., 2016) that suggest a small relation between attitudes and diet-related behaviors and with the general notion of an attitude-behavior gap. Generally, attitudes have been assumed to affect behaviors through a number of different processes such as shaping attention/ vigilance towards specific information (Roskos-Ewoldsen & Fazio, 1992), information search (e.g., Hart et al., 2009), elaboration and recall (Pomerantz, Chaiken, & Tordesillas, 1995), and attitudinal ambivalence. In the following, we will describe and discuss studies that particularly addressed the effects of attitudes on behaviors in the context of diet, eating, and body weight.

Diet

In a recent meta-analysis of 27 studies, 16 manipulated attitudes (Sheeran et al., 2016) and found medium-sized effects on intention and small- to medium-sized effects on diet-relevant behaviors. That is, a more positive attitude towards higher fruit and vegetable intake, lower fat intake, or specific nutrients showed a small-to-medium sized effect on actually eating more fruits and vegetables, less fat, or more of the specific nutrients. Importantly, none of the 16 studies solely focused their interventions on participants' attitudes, but rather, attitude was one of several socio-cognitive factors manipulated. Most of these studies focus on nutrition knowledge, fruit and vegetable intake, fat intake, or intake of specific nutrients (e.g., calcium). A potential moderator for the relation between attitudes and eating behavior is attitudinal ambivalence towards food choice, that is, when positive and negative evaluations are about equally strong. For example, Armitage and Conner (2000) tested the effects of attitudinal ambivalence towards eating a low-fat diet on intentions and actually eating a low-fat diet. They showed that low attitudinal ambivalence (i.e., when participants had a considerably stronger positive attitude towards the benefits of healthy nutrition, than a negative attitude towards the costs of healthy nutrition) predicted consuming less fat with a small-to-medium effect size, whereas high attitudinal ambivalence (i.e., the positive attitude towards the benefits of healthy nutrition was as strong as the negative attitude towards the costs of healthy nutrition) was not predictive of actual behavior. Other research has identified a potential mediator of the relationship between young adults' attitudes towards a healthy diet and their consumed diet quality, namely, nutrition label use (Graham & Laska, 2012). In their cross-sectional study they found that using nutrition labels more frequently partially explained the relation between positive attitudes towards healthy nutrition and better diet quality.

Beyond attitudes towards the healthfulness of a diet, attitudes related to religious, political, or ethical concerns regarding food choice and diet are assumed to be stronger predictors of actual behavior. In the following, we discuss the attitude – behavior – relationship for genetically modified foods, vegetarian or vegan diet, and choosing organic foods. Concerning genetically modified foods, Veccione, Feldman, & Wunderlich (2015) reported a strong correlation between consumer attitudes towards foods not containing genetically modified organisms and reported purchasing behavior, based

on a cross-sectional survey. The correlations between knowledge about genetically modified organisms and purchasing behavior were considerably lower. Generally, studies investigating the relation between attitudes towards genetically modified foods and actual consumer behaviors are direly needed, as Frewer and colleagues (2013) conclude in their systematic review.

Three primary motives for adopting a vegetarian or vegan diet are usually reported: health-related concerns, ethical concerns about animal welfare, and environmental concerns over the impact of factory farming of animals (Radnitz, Beezhold, & DiMatteo, 2015). Do people who adopt a vegetarian or vegan diet for health reasons also eat healthier compared to those who do it for ethical or environmental reasons? Yes and no. As Radnitz and colleagues (2015) show in their cross-sectional survey, citing health reasons was associated with higher reported fruit consumption and lower intake of sweets: However, participants who had given ethical or environmental reasons for their diet, reported eating more of other healthful foods (e.g., foods rich in vitamin D). Other surveys show similar findings, reporting that health reasons are the most often mentioned reason for a vegan diet and that those who follow a vegan diet report an overall healthier diet (Dyett, Sabaté, Haddad, Rajaram, & Shavlik, 2013).

The reasons consumers give for purchasing organic foods resemble those for a vegetarian and vegan diet, namely, health considerations, ethical considerations (animal welfare), political reasons (environmental impact of food production), and quality (e.g., taste; Aertsens, Mondelaers, Verbeke, Buysse, & van Huylenbroeck, 2011; Hjelmar, 2011; Onyango, Hallman & Bellows, 2007). Aertsens and colleagues (2011) report that attitudes—together with other psychological factors such as subjective knowledge about organic foods and motivation—predicts consumption of organic vegetables. Attitudes towards organic foods show a small to medium correlation with intentions for purchasing organic foods (Honkanen, Verplanken, & Olsen, 2006). As in this last survey, actual behavior was often not measured. Another survey in Switzerland showed that environment-friendly food choice (i.e., choosing foods that take up fewer resources in growing, transport, and storage, such as local plants and reduction of red meats), was best predicted by taste and health arguments, and less so by environmental friendliness (Tobler, Visschers, & Siegrist, 2011). The authors explain this

finding by the partial lack of knowledge about the impact that different modes of food production or transport have on the environment, for example, red meat or food products that are transported by air.

Interestingly, only a minority of studies examines effects of these attitudes on behavior; in most cases operationalized as purchase intentions or reports of frequency of this behavior. This could have methodological reasons (it is much more difficult to get measures of actual behavior, for example, through observation or purchase receipts). It is also possible that researchers are often rather interested in describing potential disparities in attitudes between different groups (e.g., vegetarians versus meat-eaters, men versus women, or people who have liberal versus conservative political attitudes).

Eating

Eating attitudes are frequently investigated in the area of disordered eating. Disordered eating includes a variety of behaviors, such as restrictive dieting, fasting, binge eating, purging, and a rigid approach to eating (e.g. inflexible mealtimes or refusal to eat with other people). Due to Western societies' emphasis on a slim body ideal, the prevalence of eating disorders is high and increasing, in particular among young people. For instance, a survey conducted among high school students found that 56% of female and 28% of male students reported disordered eating behaviors (Croll, Neumark-Sztainer, Story, & Ireland, 2002). Disordered eating behaviors are associated with severe health risks, including clinical eating disorders (e.g. Anorexia Nervosa; Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004), as well as weight gain and obesity (Tanofsky-Kraff et al., 2006; Stice, Cameron, Killen, Hayward, & Taylor, 1999). For example, adolescents engaging in disordered eating are two to three times more likely to develop overweight 5 years later (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006). Due to the social pressure to be thin, negative attitudes towards eating and body shape are thought to play an important role in disordered eating (Cafri, Yamamiya, Brannick, & Thompson, 2005; Goldschmidt, Aspen, Sinton, Tanofsky-Kraff, & Wilfley, 2008; Powell & Kahn, 1995). For instance, body dissatisfaction has been identified as a risk factor for unhealthy weight-loss strategies, restrictive eating and bulimic behavior (Dunkley, Wertheim, & Paxton, 2001; McCabe & Ricciardelli, 2005; Neumark-Sztainer et al., 2006; van der Berg et al., 2004). Stice, Shaw, Becker, and Rohde (2008) developed a dissonance-based intervention to change negative eating attitudes to prevent

disordered eating. More specifically, they let their participants argue against the Western culture's thin body ideal to induce cognitive dissonance. To decrease their dissonance, participants are expected to change their thin ideal, which in turn leads to a reduction of disordered eating attitudes and behavior. Indeed, it was found that relative to a control condition, dissonance-based interventions reduced body dissatisfaction, dieting, bulimic symptomatology, as well as the risk for obesity and eating disorder onset in the future.

Attitudes are also relevant in other eating behaviors, such as regular mealtime patterns. It has been shown that negative attitudes towards eating breakfast were significantly associated with the probability of breakfast skipping (Tapper et al., 2009). One school based educational intervention program showed an increase in the attitudes towards the importance of eating breakfast and in eating healthier breakfasts (Eilat-Adar, Koren-Morag, Siman-Tov, Livne, & Altmen, 2011). Breakfast skipping may also be associated with body dissatisfaction and the desire to be thin. For example, data suggest that among US high school students, approximately 44% of students with a history of diet attempts used meal skipping in order to regulate their body weight (Calderon, Yu, & Jambazian, 2004). In these cases, dissonance-based interventions leading to attitudinal change may be another way to increase breakfast consumption. However, data suggest that common reason for breakfast skipping also include factors outside the individual, such as time constraints (Cheng et al., 2008). Thus, changing attitudes alone may only have limited effects, but should be combined with other factors, for example, time management (or perceived behavioral control) in the case of breakfast skipping.

An increasing amount of research has suggested that eating together with the family has several health benefits for children and adolescents. Health benefits include higher fruit and vegetable consumption, lower fast food and snack food consumption, and a lower risk for overweight and obesity (Dallacker, et al., 2017; Hammons & Fiese, 2011). However, data suggest that a significant proportion of children and adolescents do not have regular family meals (e.g., 32% of students report that they have fewer than three family meals per week; Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000). Importantly, parents as well as adolescents value the sharing of meals with their families and believe in the importance of shared meals (Fulkerson, Neumark-Sztainer, & Story, 2006; Martin-

Biggers et al., 2014). Thus, family meals are an example for an attitude-behavior gap in the context of healthy eating. Similar to eating breakfast, reasons for the attitude behavior gap concerning regular family meals include time constraints, such as work schedules and children's afternoon activities (Martin-Biggers et al., 2014).

Body weight

Many individuals have negative attitudes about people with excess body weight, and in particular overweight and obese people. For example, in Germany, 24% of the population agreed to statements such as “fat people have no willpower” or “most fat people are lazy” (Hilbert, Rief, & Braehler, 2008). Stereotypes in the USA are similar, further including adjectives such as unsuccessful, unintelligent, or noncompliant with weight loss treatments (e.g., Puhl & Heuer, 2009). About 10% of women feeling discriminated because of their weight. In fact, rates of discrimination are comparable to racial discrimination (Puhl, Andreyeva, & Brownell, 2008). Representative surveys showed that individuals in Germany, the USA and the UK predominately attribute responsibility for obesity to the individual (Mata & Hertwig, 2017). This attribution has direct consequences: People showing stigmatizing attitudes towards obesity or attributing responsibility for obesity mostly to the individual show lower willingness to support policy measures or to financially support prevention measures (Hilbert et al., 2008; Mata & Hertwig, 2017).

We are not aware of studies that directly measure the relation between negative attitudes towards overweight individuals and behavior showing discrimination or maltreatment of people with overweight. However, there are several indicators of congruence between attitudes and behavior related to excess body weight: Several reviews have observed negative attitudes of health care professionals towards overweight or obese patients (Puhl & Brownell, 2001; Puhl & Heuer, 2009). Other studies have found poorer treatment of these patients, for example, professionals spending less time and providing less education to obese patients compared to slimmer patients (Bertakis, & Azari, 2005; Hebl & Xu, 2001). Also, several studies show that people with obesity feel disrespected by health care professionals; they report the experience that any type of medical problem they have is being attributed to their weight, and that they are reluctant to address their weight problems in medical settings (e.g., Anderson & Wadden, 2004; Amy, Aalborg, Lyons, & Keranen, 2006). Particularly

severely obese women even delay or avoid preventive health care treatments; reasons include disrespectful treatment and negative attitudes from health care providers (e.g., Amy et al., 2006; see also Penner, Albrecht, Dovidio, Manning & van Ryn, this volume, for a discussion of attitudes and racial stigma).

How do attitudes towards diet, eating, and body weight change?

We are not aware of systematic reviews or meta-analyses that have investigated the relation between interventions and general attitudes towards diet, eating, and body weight. So far, individual studies on specific aspects of these topics are available. In the following, we describe and discuss methods and findings for a selection of particularly relevant and heavily debated topics: one topic exemplary for diet, one for eating behavior, and one for body weight: Changing attitudes about nutrition and food choice using food labels, about family meals using general education campaigns, and about prevention of overweight and weight stigma using education about causes and consequences of overweight.

Changing attitudes towards nutrition and food choice with food labels

One of the major instruments in making consumers' diets healthier is food labels. Few types of information have such a large dissemination. Basically all packaged supermarket foods contain nutrition information and other health-related claims. Goals of food labels include educating the consumer about a product and promoting transparency about available characteristics about a product group (e.g., van Trijp, 2009). Packaged supermarket foods come with a variety of labels, including nutrition labels and health claims. Nutrition labels usually take two forms, the nutrition facts panel at the back of the package and the front-of-pack labels presenting a summary of the back-of-package nutrition panel. "Health claim" is an umbrella term for different specific types of claims, including implied health claims that refer to the health benefit of products without further clarification of potential underlying mechanisms (e.g., "salt conscious"), nutrient claims that inform about the presence or absence of a specific nutrient (e.g., "low in sugar", "reduced fat"), general-level health claims that relate nutrients in the food to a beneficial health outcome ("reduced sugar to help prevent caries"), and higher-level health claims that relate specific nutrients to serious diseases ("contains antioxidants that can reduce your risk for certain types of cancer"; see Talati, et al., 2017, for a review). A

necessary precondition for successful consumer information about the healthiness of a product through labels and claims is that the consumer is able to interpret nutrition labels and health claims. Labels and claims are better understood if evaluation standards/ reference values are provided (e.g., Grunert & Wills, 2007; Jones & Richerson, 2007; Mata, Lippke, Dieckmann, & Todd, 2011), for example, in the form of color-coding such as in the traffic light nutrition label or the five-colour NutriScore, which has been recently implemented as the new official nutrition label in France (Julia et al., 2017).

The mere presence of nutrition and health claims can positively influence consumer attitudes towards the claim, and in turn towards the product that bears the claim (e.g., Talati et al., 2017; Wills, Bonsmann, Kolka, & Gruner, 2012, for reviews). The presence of health claims seems to particularly benefit perceived healthiness of foods that possess a generally positive health image, such as yoghurt or cereals (e.g., van Kleef, van Trijp, & Luning, 2005). However, products such as yoghurt or cereals did not further increase their perceived healthiness from a claim informing about an added functional component, such as special bacteria. However, products with a less healthy image, for example, candies, spreads, or mayonnaise, were perceived as healthier once they carried such additional functional health claims (see Wills et al., 2012, for an overview). Importantly, the more positive the general attitude of consumers towards foods with health benefits, or the higher the personal relevance of the health claim (e.g., having a relative with the health condition that the claim targets), the stronger the added positive effect of a health claim (Verbeke, Scholderer, & Lähteenmäki, 2009).

The presence of health claims often leads to a particularly favorable evaluation of a product. Van Trijp (2009) has described three different effects: (1) *Halo effects*, that is, the positive benefits claimed for one specific nutrient, are generalized to other nutrients (e.g., a product low in sugar is also assumed to be low in fat); (2) *magic bullet effects*, which leads consumers to imagine health benefits for the entire product that go beyond the original health claim, and (3) *interactive effects*, where consumers take the information contained in the health claim for granted and do not search for other information or verify the claim by – for example – looking at the nutrition facts panel on the back of the product. Considering these effects of health claims is important because most products with a health claim are not or only minimally healthier than products without such a claim (e.g., Debeljak, Pravst, Kosmelj, & Kac, 2015; Schaefer, Hooker, & Stanton, 2016). Presenting understandable,

additional sources of nutrition information, particularly front-of-package-labels and, to a lesser extent, nutrition food panels of the back of food packages, can considerably reduce these halo, magic bullet, or interactive effects (Talati et al., 2017), especially in individuals with high motivation for healthy diets and food-related knowledge.

To sum up, nutrition and health-related information on food products can considerably influence attitudes towards the product, particularly concerning whether this product is good or bad for one's health. Also, they can remind people of their attitude at the point of purchase. Importantly, the interpretation of this information is subject to non-warranted generalization of benefits by consumers that can be counteracted through easy-to-understand nutrition information on food packages.

Changing parental attitudes towards improving eating in children

Parents play an important role in their children's eating behavior. As their children's nutritional gatekeepers, they determine approximately 70% of what and how much their children eat (Wansink, 2006). A large number of studies suggests that parents are a role model for their children's healthy and unhealthy eating behavior. For example, Hebestreit et al. (2017) found similarities between the food intake and eating behavior of children and their parents. Importantly, children's eating behavior may not only be influenced by their parents' eating behavior but also by their parents' eating related attitudes. In her review on parental influences on children's diet behavior, Wardle (1990) suggested: "*Parental attitudes must certainly affect their children indirectly through the foods purchased for and served in the household (...) influencing the children's exposure and (...) their habits and preferences.*"

Several studies have investigated the role of parental attitudes in children's disordered eating. Two mechanisms, an indirect and a direct one, have been suggested to explain the link between parents and their children's eating attitudes and behavior (Bardone-Cone, Harney, & Sayen, 2011; Rodgers & Chabrol, 2009). The indirect mechanism is role modeling, suggesting that parents model eating-related attitudes. For example, several studies found a link between mothers' and daughters' levels of weight concern and body dissatisfaction (e.g. Elfhag & Linné, 2005; Steiger et al., 1995). The direct mechanism is communication, that is parents expressing their attitudes towards their

children's shape, weight and eating behavior. For instance, several studies have shown that parental teasing has been identified as a predictor of body dissatisfaction, disordered eating and eating disorders among girls (e.g. Ata, Ludden, & Lally, 2007; Dixon, Adair, & O'Connor, 1996; Keery, Boutelle, van den Berg, & Thompson, 2005, Wertheim, 2002). Similarly, parental attitudes towards breakfast and their belief that breakfast helps concentration have been shown to predict breakfast skipping behavior in adolescents (Cheng et al., 2008).

Given the high prevalence of disordered eating in adolescents, early prevention is key and parental eating and body weight related attitudes offer an important target for prevention and intervention. Parental involvement has become an essential part of programs aiming to prevent childhood obesity (Golley, Hendrie, Slater, & Corsini, 2011). However, most studies are multi-component interventions, making it difficult to disentangle the unique contribution of parental attitudes.

Changing attitudes towards overweight and overweight prevention policies using general education

Several studies have documented weight stigma or weight bias against people with overweight or obesity (Hilbert, et al., 2008; Puhl & Heuer, 2009, for a review). Fewer studies have examined the causes of these biases and stigma. In their review, Puhl and Brownell (2003) identified the attribution model as the most plausible and well-tested model to explain weight stigma. It states highly prevalent general notions in the US population, for example, "people get what they deserve in life", a Protestant work ethic, and Just-World-Beliefs attribute responsibility for obesity to the individual and thus can explain the most commonly reported stereotypes of people with obesity: lack of willpower, laziness, poor self-discipline, and self-indulgence. This is also in line with other research demonstrating that perceived controllability of the causes and maintenance of obesity decreased stigma (e.g., Weiner, Perry, & Magnusson, 1988). In line with attribution theory, educating people about biological, genetic, and uncontrollable reasons for obesity improved attitudes towards obesity (Crandall, 1994, but see Teachman, Gapinski, Brownell, Rwalins, & Jeyaram, 2003, for no such effect). In another experiment relying on a sample representative for the US population, participants who were shown messages on consequences of obesity as reasons for government action, for example, reduced military readiness,

increased their perception of seriousness, endorsement of responsibility beyond the individual, and policy support compared to a control condition (Gollust, Niederdeppe, & Barry, 2013).

An additional potential factor influencing attitudes towards obesity is news coverage, for example, demographic and behavioral characteristics of overweight and obese individuals pictured in the images in two high-circulation US-news magazines. Generally, people with obesity are stigmatized in the media (Greenberg, Eastin, Hofshire, Lachlan, & Brownell, 2003). One study found that compared to their actual prevalence, white Americans, girls, and women with obesity were largely overrepresented whereas older adults with obesity were largely underrepresented (Gollust, Eboh, & Barry, 2012). Further, in only about a quarter to a third of the images people were shown to be exercising or active. While this might prevent further stigmatization of minority groups and increase recognition in white Americans that obesity is a problem that affects them – with implications for the endorsement and support of specific public policies – it might also cover up existing health disparity between different ethnic groups (see Gollust et al., 2012, for a discussion). Further, images of inactive people with obesity could further feed existing stereotypes. For example, people who were shown negative photographs of obesity also expressed more negative attitudes about people with obesity than those shown positive photographs (see McClure, Puhl, & Heuer, 2011, for an experiment).

An alternative approach to reducing weight stigma – next to education about causes and consequences of obesity – could be using a social consensus framework. The idea is, that stigma is a social construct and is influenced by its expression and endorsement through others. Three experiments showed that participants (a) decreased negative and increased positive stereotypes about people with obesity after learning that others held more favorable attitudes about obesity, (b) improved attitudes when they learned about favorable attitudes of obese people from sources that were part of their in-group compared to learning from out-group persons; and (c) feedback about a social consensus on favorable views about people with obesity increased perceived positive traits and decreased perceived negative traits (Puhl, Schwartz, & Brownell, 2005; see also Penner, Albrecht, Dovidio, Manning, & van Ryn, this volume, for the role of attitudes in clinical practice; and Dovidio, this volume, for the role of attitudes in intergroup relations). The interventions described here changed attitudes towards people with obesity or policies targeting obesity using a variety of evidence-based

behavior change techniques (see Michie et al., 2013, for a classification), including: comparison of behavior, specifically information about other's approval and social comparison; comparison of outcomes, specifically persuasive arguments and comparative imagining of future outcomes.

Outlook: What have we learned so far and open questions

Diet, eating, and body weight root in multifactorial, complex behavioral processes and behaviors. In this chapter, we have examined the role of attitudes for understanding them. Attitudes are an integral part of many psychological models on health behaviors and health behavior change. Usually, attitudes are one of several predictors. They best predict intention and appear to only have a small impact on behavior (Sheeran et al., 2016, for a meta-analysis on diet behaviors). Further, some models that have shown to predict long-term behavior change in eating, diet, and body weight such as the Self-Determination-Theory skip attitude as predictor at all.

Does this mean that other researchers should follow suit and send attitudes down the rank? In our view, there are two ways to err. One is by discarding attitudes altogether. Let us keep in mind that most models of health behavior change do propose attitudes as an (indispensable) predictor for intentions to maintain or change a health-relevant behavior. Yet, attitudes are commonly conceptualized as a necessary but by no means sufficient condition for diet quality or eating behavior. But this does not set attitudes apart from other factors. There is no silver bullet. The dire truth is that in order to boost the probability of long-term behavior change toward healthier diets and eating there is no easy path to success. Myriads of factors—including individual (cognitive, motivational, and volitional), social (parents, significant others, stigma), and environmental (including built environment, information environment, and policy) factors—need to be taken into account. Even then, other factors such as heritability must not be neglected. They explain an estimated 50 to 90% of the variance in body weight (Llewellyn & Wardle, 2015). Although genetic predisposition cannot explain the rapid rise in obesity during the last decades, they can explain why within the same environment some people gain more weight than others. The other way to err is, therefore, to propose that an implicit positive attitude towards unhealthy foods could explain childhood obesity or to assume that changing an attitude towards healthy or unhealthy foods is the royal road to healthy nutrition and body weight.

There may, however, be one area in which attitudes represent both a necessary and a sufficient condition to change behavior: weight stigma. Weight stigma for overweight and obese people is highly prevalent in the general population (e.g., Hilbert et al., 2008; Puhl & Heuer, 2009) and other relevant groups such as health care professionals (Puhl & Brownell, 2001; Puhl & Heuer, 2009). Weight stigma is blamed for disadvantages in people with overweight and obesity, including more difficulties finding a job and lower pay (Puhl & Heuer, 2009). Although experts agree that environment factors need to be primarily blamed for the rise in overweight and obesity over the last decades, the public continues to attribute the main responsibility to the individual (e.g., Mata & Hertwig, 2017). This is not without consequences: The more responsibility is attributed to the individual, the more likely respondents desire individuals to pay for their own treatment. Relatedly, policies targeting the individual (such as nutrition labels) are perceived as more effective than those targeting the environment (e.g., ban of soda vending machines or higher taxes on sugary foods). In other words, policies that most experts predict to be successful in the prevention of overweight and obesity conflict with the public's attribution of responsibility to the individual (e.g., Mata & Hertwig, 2017). Through public opinion polls that inform policy making, attitudes can have enormous leverage. Yet, attitudes are not cast in stone. Some researchers have shown that changing such attitudes is possible (e.g., Gollust et al., 2013; Puhl et al., 2005). Consequently, educating the public attitudes—for instance, by informing about the causes and consequences of obesity and establishing social consensus – can ultimately help to rally the support for prevention and intervention measures that promise to have substantial long-term effects on eventually diet, eating, and body weight. The fight against tobacco smoking has also been a fight over the public's attitudes towards smoking—for instance, a life style choice or an activity that stands to harm third parties and, perhaps, even our loved ones—and regulatory and fiscal policy measures (e.g., prohibitions and tobacco tax) were likely to be foreshadowed and perhaps rendered possible by attitude changes. Therefore, attitudes should not be written off in a competitive marketplace of policy ideas—but let us have a differentiated assessment of their impact.

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