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Antecedents of consumer evaluation and consumption of functional food

Theory of planned behavior, personality traits, personal values, and future time perspective

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Abstract

Purpose—Functional foods are food products that have been enriched with minerals, vitamins, fatty acids, or proteins to make them healthier or to prevent diseases. Functional food is an ever-growing global phenomenon and new product launches to the category occur frequently. The term *functional food* is, however, ambiguous and prone to misunderstandings. Little is known about Norwegian consumers' perceptions and evaluations of functional food. To gain a deeper understanding of the psychological mechanisms involved in consumers' evaluation of and behavioral tendencies regarding the consumption of functional food, this thesis aims to identify, explore, test, and explain whether and how behavioral intentions and consumption of functional food (behavioral tendencies) are influenced by consumers' attitudes (cognitive and affective), social norms (descriptive and injunctive), perceptions about behavioral control (controllability and self-efficacy), time perspective, individual personality traits, and food-specific personal values. The main objectives of this dissertation are thus (a) to test and establish whether an extension of the theory of planned behavior has increased explanatory ability, (b) to investigate the roles of personality traits and time perspective in explaining consumption, and (c) to explore and discuss whether consumer profiles based on individual, food-related values and traits are differentially related to consumer evaluation and consumption of functional food. The current research is guided by the theory of planned behavior, which is one of the most frequently used social cognition models employed to identify, explain, and predict health and food consumption behaviors.

Design/methodology/approach—The papers are based on survey data from a representative sample of 810 Norwegian adults. Structural equation modeling (SEM), using AMOS and RStudio with the *lavaan* package, was applied to analyze the data in paper 1 and paper 2, respectively. For paper 3, hierarchical k-means clustering, using the packages *cluster* and *factoextra* in RStudio, was applied. Paper 1 addresses the antecedents of consumers' attitudes and behavioral tendencies toward the consumption of functional food using an extended version of the theory of planned behavior. In paper 2, an integrative and hierarchical structure of personality traits–food-related time perspective–consumption behavior is specified and tested. Finally, paper 3 explores the intraindividual organization of food- and health-related values and traits to determine the existence of subgroups of consumers with similar profiles, and whether attitude, intention, and consumption behavior differentiate subgroups.

Findings and contributions—The first paper addressed antecedents of consumers' attitude and intention to consume functional food using an extended version of the theory of planned behavior. The results demonstrated that the extended model increased explained variance from 64.8% to 70.5% ($f^2 = 0.19$; medium- to large-effect size). Self-efficacy shared the strongest association with intention to

consume functional food, followed by attitude and social norms. Except for controllability, which was negatively related to intention, all of the other antecedents of intention had the expected positive sign. Utilitarian eating value contributed strongly and positively to attitude formation, while the relationship between hedonic eating value and attitude was weak and negative. The increased explained variance provides a deeper understanding of consumers' motivation and behavior related to the consumption of functional food. The occasionally used self-efficacy-as-motivation argument was here rejected as an explanation for the strong association between self-efficacy and intention.

The purpose of paper 2 is twofold: First, it contributes to the ongoing debate on time perspective dimensionality and specifies and compares a unidimensional to a bidimensional measurement model of consideration of future consequences (CFC) pertaining to food choices. Second, it addresses how the big five personality traits and CFC interact in explaining variation in functional food consumption. The results are supportive of a bidimensional factor structure for CFC, wherein one dimension reflects consideration of immediate consequences (CFC-Immediate) and the other taps into consideration of future consequences (CFC-Future). Both CFC-Future and CFC-Immediate are positively associated with functional food consumption, the former being the stronger predictor. A comparison between the two main models—a full vs. partial mediation model—yields support for retaining the partial mediation model. It suggests that the personality traits conscientiousness, agreeableness, and neuroticism are positively and indirectly associated with consumption of functional foods through CFC-Future.

Paper 3 sought to explore and determine the existence of subgroups of consumers with similar profiles or combinations of traits and values and to investigate how attitudes and behavioral tendencies toward eating functional food differ between these consumer segments. The results demonstrate how food- and health-related values and traits can successfully discriminate between homogeneous groups of consumers to form useful consumer profiles. The person-centered approach allows for uncovering and understanding consumer profiles based on combinations of food-relevant personality traits and personal values. The three consumer profiles identified—*convenience-oriented*, *self-controlled*, and *careless*—differ in their propensity to consume functional foods and their attitudes and intentions regarding functional food consumption. The combination of being convenience oriented, having a low level of self-control, and being concerned about weight gain is a significant descriptor of consumers more inclined to favor functional food.

This thesis contributes to the existing literature on the explanation and understanding of individual differences in the evaluation and consumption of functional food by combining a variable- or construct-centered approach (SEM) with a person-centered approach (clustering technique). The

present research enhances the understanding of the underlying motivations behind consumers' evaluation of and behavior toward functional foods. One key finding from paper 1 is the differential influence that hedonic and utilitarian eating values exert on attitude toward consuming functional food. From paper 2, the differential effect of future- and immediate time perspectives on consumption of functional food represents one important contribution. Another key finding is the nature of the personality trait–time perspective–behavior relationship. Finally, in addressing the intraindividual organization of food-related personality traits and personal values, paper 3 confirms how consumer profiles differ in their evaluations of and propensities to consume functional food.

Research limitations—The current research relies on a cross-sectional design with self-reported data, which entails drawbacks, particularly regarding causal explanation and method biases. The retrospective measure of consumption frequency also renders causal explanations inappropriate. Another general limitation lies in the superordinate definition of functional food employed—that is, disregarding specific functional food products and rather focusing on functional food as an overarching food category. Alternative research designs are welcomed and plans for conducting consumer and sensory experiments have been initiated.

Originality/value—Functional food still has limited outreach in the Norwegian marketplace compared with other markets. This research is, to the author's knowledge, the first comprehensive effort to gain important insights into consumers' evaluations of and motivations toward consuming foods enriched with functional components. The results should therefore be useful to better target functional food according to consumers' motivational antecedents and personal features.

Acknowledgements

This dissertation marks the end of a long and winding road. It all began while on paternity leave following the birth of Pia, my firstborn daughter. Møre og Romsdal County municipality had only just agreed to fund my project when it was time for me to pick up the baton from my wife and stay home. When I returned from paternity leave, all the formalities were in place, and I could start my PhD journey at the School of Business and Economics, UiT The Arctic University of Norway in late 2017. Although I have been formally affiliated with Tromsø, throughout this period I have been physically located in Ålesund where I live and where my workplace at Møreforsking is. I will admit that the spatial distance between the two cities and between my supervisor, Professor Svein Ottar Olsen, and myself has been challenging from time to time. Svein Ottar's commitment, guidance, and willingness to share from his reservoir of expertise during these years, however, outweighs the distance and far exceeds my hopes and expectations. I could not have done this without you, and I am very grateful that you wanted to be my mentor and supervisor, Svein Ottar.

Before turning my attention to other significant supporters, I feel obligated to mention a life-changing event that took place as I entered what was to be the final year of my PhD. My wife and I were expecting our long-awaited second child, the last piece of the family puzzle. Unfortunately, Håkon was terminally ill when he was born and never got to experience the outside of the neonatal intensive care unit where he died only 20 days old, March 20, 2020. Our stay in the hospital coincided with the onset of the coronavirus pandemic, which imposed a ban on hospital visits and effectively deprived Pia of the opportunity to even get to meet her baby brother. The reconciliation of his passing is persistent and at times all-consuming. How we wish you were here, Håkon.

I would like to express appreciation to Møreforsking for giving me the opportunity and time to pursue a doctorate degree in my current position at the institute. I would also like to acknowledge Møre og Romsdal County municipality for financial support.

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Paper 1. Nystrand, B. T., & Olsen, S. O. (2020). Consumers' attitudes and intentions toward consuming functional foods in Norway. *Food Quality and Preference*, 80, 103827. <https://doi.org/10.1016/j.foodqual.2019.103827>

Journal metrics (2020):

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Paper 2. Nystrand, B. T., Olsen, S. O., & Tudoran, A. A. (2021). Individual differences in functional food consumption: The role of time perspective and the Big Five personality traits. *Appetite*, 156, 104979. <https://doi.org/10.1016/j.appet.2020.104979>

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Paper 3. Nystrand, B. T., & Olsen, S. O. (2021). Relationships between functional food consumption and individual traits and values: A segmentation approach. *Journal of Functional Foods*, 86, 104736. <https://doi.org/10.1016/j.jff.2021.104736>

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- CiteScore: 6.8 (ranks 34/310 in Food Science)
- Publisher: Elsevier
- Acceptance rate: N/A

PART 1. INTRODUCTION

The overall purpose of this dissertation is to gain a deeper understanding of the psychological mechanisms involved in consumers' behavior regarding the consumption of functional food. This will be pursued by identifying, exploring, testing, and explaining whether and how behavioral intentions regarding, and consumption of functional food (behavioral tendencies) are influenced by consumers' attitudes (cognitive and affective), social norms (descriptive and injunctive), perceptions about behavioral control (controllability and self-efficacy), time perspective, individual personality traits, and food-specific personal values. This study also contributes to the existing literature on the explanation and understanding of individual differences in the evaluation and consumption of functional food by combining a variable- or construct-centered approach (structural equation modeling, SEM) with a person-centered approach (clustering technique). Finally, the theory-based assumptions are tested on a nationwide and representative sample of Norwegian consumers.

1.1 Background

Eating is among the most frequent behaviors in which humans engage, thus driving great interest in understanding the underlying factors that influence food choice decisions and consumption behavior (Köster, 2009; Symmank et al., 2017). Diet is today more than just the provision of sufficient amounts of nutrients—it may also “modulate various functions in the body and may play detrimental or beneficial roles in some diseases” (Roberfroid, 2000, p. 1660S). Increased knowledge of the dietary influence on health and well-being coupled with rising healthcare costs, longer life expectancy, an aging and ever-growing population, and scientific and technological advances, has paved the way for the concept of functional food (Kaur & Das, 2011; Roberfroid, 2000; Vergari et al., 2010). Other concurrent, and to some extent overlapping, food trends include those related to organic food (Rana & Paul, 2017), natural food (Román et al., 2017), convenience food (Jackson & Viehoff, 2016), local food (Feldmann & Hamm, 2015), and traditional food (Verbeke, 2013).

The term functional food was coined in 1984, in Japan, following the instigation of a large-scale research program with the objective of identifying foods and food substances with disease-preventing properties (Arai, 1996; Iwatani & Yamamoto, 2019). In 1991, the Food for Specified Health Uses (FOSHU) was established as a legislative framework to ascertain that the food's safety and effectiveness for health fulfills the requirements needed. Other countries soon followed, and functional food is today recognized as a global phenomenon (Vergari et al., 2010).

Functional foods are “fuzzy” borderline food products positioned between medicine and food, promising to provide additional health benefits over conventional products (Khedkar et al., 2017; Neupane et al., 2021; Roberfroid, 1999). They offer a combination of health and convenience (Grunert, 2010) and are recognized as part of an emerging trend in the food industry (Corbo et al., 2014; Santeramo et al., 2018). The global market for functional food is expected to reach USD 275.77 billion by 2025 (Grand View Research, 2019). Generally, functional foods are those food items providing specific health benefits beyond basic nutrition (Alongi & Anese, 2021), promoting optimal health, and reducing the risk of non-communicable diseases (Granato et al., 2020; Granato et al., 2017). Functional food products are omnipresent across food categories, particularly within the dairy, confectionery, soft drink, bakery, and baby food categories (Guiné et al., 2020; Vergari et al., 2010).

Numerous definitions of functional food have been proposed (Doyon & Labrecque, 2008; Gur et al., 2018; Kaur & Das, 2011). As of yet, no universal agreed-upon definition exists, and the concept of functional food continues to be ambiguous, often misunderstood, and abused (Topolska et al., 2021). In fact, Roberfroid (2002) argued almost 20 years ago that no simple, universally accepted definition will ever come to exist because of the large variety of (known and yet unknown) components affecting bodily functions. To complicate matters even further, a related concept, *nutraceuticals*, is often used in parallel with functional food by both consumers and industry (Gul et al., 2016). Nutraceuticals do, however, differ from functional foods in that this term denotes “health-promoting compounds or products that have been *isolated or purified* [emphasis added] from food sources” (Aluko, 2012, p. viii) to be “supplied in other than a food form” (Laparra & Sanz, 2010, p. 220). Functional food is thus food, while nutraceuticals are not: “nutraceuticals are commodities derived from foods, but are used in the medicinal form of pills, capsules, potions and liquids” (Shahidi, 2009, p. 376).

A common way to differentiate between types of functional food is to distinguish between fortified, enriched, and altered products on the one hand, and enhanced commodities on the other (Siró et al., 2008). Briefly, following Spence (2006), fortification implies increasing the content of existing nutrients such as adding vitamin C to orange juice. Enrichment is adding new nutrients or functional ingredients not normally found in a particular food, for example by adding omega-3 to dairy products. Alteration involves replacing existing, potentially harmful components with other, more beneficial components. Reducing salt by replacing sodium chloride with potassium chloride or other flavor enhancers is a widely used approach to alteration. Lastly, enhanced commodities are achieved by altering the nutrient composition of raw commodities, a well-known exemplar being golden rice—an engineered variety of rice containing vitamin A (Tang et al., 2009). Other definitions of functional food also include whole foods or natural commodities such as fruits and vegetables (e.g., Martirosyan & Singh, 2015).

The attractiveness of functional foods resides in combining convenience with health. Staple foods such as dairy and cereal products are made healthier by enrichment, thus providing an easy avenue for people to choose the healthier option without completely changing their consumption patterns, such as by opting for milk with added vitamin D rather than keeping with the conventional counterpart. A major barrier, on the other hand, can be ascribed to the price premiums associated with functional foods (Annunziata & Vecchio, 2011; Siró et al., 2008): The price of food is consistently one of the most important food choice motives reported (Markovina et al., 2015). Functional food has been posited to constitute the perfect marketing strategy: “creating differentiated, value-added products, appealing to health (a basic and universal human need) and directed to a premium-price sector” (Falguera et al., 2012, p. 276). One hurdle in reviewing the literature stems from the above-mentioned confusion about what constitutes a functional food. Some (review) studies adhere to a broad definition while others to more restricted definitions (Mogendi et al., 2016). The same applies to the various estimates of market share, value, and outreach.

This dissertation adheres to the fortified/enriched products category and leans on a definition of functional food (Doyon & Labrecque, 2008; Laros & Steenkamp, 2005) that excludes naturally healthy foods such as vegetables and fruits. It specifically introduces a definition that states that functional foods are food products that *have been enriched* with minerals, vitamins, fatty acids, or proteins to make them healthier or to prevent diseases. Functional foods are further part of a standard diet, consumed on a regular basis, and in normal quantities. As such, dietary supplements are also excluded. The purpose of opting for such a restricted definition is to avoid any ambiguity when evaluating items related to functional food behavior. This constrained definition holds that a functional food is one in which functional ingredients have been incorporated—that is, they are a manufactured rather than a natural food product.

This thesis focuses on consumer evaluation of functional food consumption, and its main contributions lie in the identification of key psychological antecedents and individual differences that influence subjective perceptions, attitudes, and behavioral tendencies toward the consumption of functional food.

1.2 Exploring antecedents of functional food consumption

Research aimed at explaining or predicting consumer evaluation of functional food ranges from focusing on sociodemographic variables and product attributes to examining the psychological antecedents underlying behavior (for reviews, see Bimbo et al., 2017; Kaur & Singh, 2017; Mogendi

et al., 2016; Santeramo et al., 2018; Siró et al., 2008).¹ Primary drivers include the general promotion of health and wellness, as well as disease prevention or minimization (e.g., health motivation; Siegrist et al., 2015; Thompson & Moughan, 2008). Functional foods are thus often accompanied by (front-of-package) health claims that “typically promise specific improvements in physiological functions or reduced risks of diseases” (Lähteenmäki, 2011, p. 109). Claiming that a functional food provides health benefits can, however, have negative effects on consumer perceptions and evaluations of other important product attributes, including taste and naturalness (Lähteenmäki, 2013; Lähteenmäki et al., 2010). Although health motivation is perhaps the most important antecedent of functional food consumption (Topolska et al., 2021), sensory attributes such as (good) taste should not be neglected (Siró et al., 2008), as it is unlikely that consumers will compromise on taste at the cost of health benefits (Verbeke, 2006). While findings are mixed and contradictory, psychological or cognitive antecedents such as attitude, perceptions, and beliefs are imperative for understanding consumer evaluation of functional food (Bimbo et al., 2017; Mogendi et al., 2016; Siró et al., 2008).

Regarding sociodemographic features, a near consensus has been reached regarding gender, whereby women are consistently shown to have higher levels of acceptance and to be the more likely consumers of functional foods than men. Likewise, regarding age, being older rather than younger seems to be a sound descriptor of functional food consumers. Level of education or income level also appear as relevant variables, such that higher levels are characteristic of functional food consumers. However, the influence of gender, age, and education varies as a function of “both the type of functional food and its claim” (Siró et al., 2008, p. 465).

Recent reviews (Bimbo et al., 2017; Santeramo et al., 2018) have also identified various personal values or personality traits that influence the consumer evaluation of functional foods, but studies investigating whether individual differences in broader behavioral dispositions relate to functional food consumption are still scarce. With respect to food consumption behavior in general, several recent reviews (Esposito et al., 2021; Lunn et al., 2014; Machado-Oliveira et al., 2020) demonstrate important links to personality traits. For example, conscientiousness is consistently related to eating healthily, while neuroticism is associated with unhealthy eating habits. Conscientiousness is further associated with a future time perspective, and both constructs relate to health-related behaviors and beneficial outcomes, including engagement in healthy behaviors (Baird et al., 2021; Kooij et al., 2018; Murphy & Dockray, 2018). Little research has explored the role of personality traits and time perspective in explaining functional food behavior, leaving a research gap for further investigation.

¹ Kaur and Singh’s (2017) review has been retracted (for retraction notice, see Kaur & Singh, 2019).

Table 1 provides a list of reviews and overview articles concerning functional food, particularly from a consumer behavior perspective (the list is not exhaustive).

Table 1. Example review articles and research on functional food from a consumer and market perspective

Author(s), year	Scope	Publisher
Menrad, 2003	overview about the market situation for functional food in Europe	<i>J Food Eng</i>
Siró et al., 2008	review the current functional food market situation, future potential, and main challenges	<i>Appetite</i>
Ozen et al., 2012	assess differences in the worldwide consumption of functional foods	<i>Nutr Rev</i>
Bigliardi & Galati, 2013	specific emphasis on the definition and the main examples of functional food, and future trends	<i>Trends Food Sci Technol</i>
Corbo et al., 2014	focus on commercially available functional beverages	<i>Compr Rev Food Sci Food Saf</i>
Mogendi et al., 2016	review evidence of the underlying determinants of consumer evaluation of nutritious food	<i>Int J Food Sci Nutr</i>
Kaur & Singh, 2017	review studies investigating various facets of consumer behavior toward functional foods	<i>Appetite</i>
Bimbo et al., 2017	review research on consumer acceptance of and preferences for functional dairy products	<i>Appetite</i>
Santeramo et al., 2018	functional food as an emerging trend in the food industry	<i>Food Res Int</i>
Dolgopolova & Teuber, 2018	review consumers' valuations of foods with healthy attributes (meta-analysis)	<i>Appl Econ Perspect Policy</i>
Plasek & Temesi, 2019	identify aspects that make functional food credible for consumers	<i>Appetite</i>
Birch & Bonwick, 2019	review the drivers of consumer choice of functional food	<i>Int. J. Food Sci. Technol.</i>
Bakshi et al., 2020	review consumers' attitudes toward functional foods	<i>Curr Top Nutraceutical Res</i>
Granato et al., 2020	define and classify functional foods, and exemplify recent and relevant studies	<i>Annu Rev Food Sci Technol</i>
Guiné et al., 2020	explore the factors that determine acceptance and willingness-to-pay for food innovations	<i>Foods</i>
Topolska et al., 2021	provide better understanding of the needs and behavior of consumers regarding functional food	<i>Int J Environ Res Public Health</i>

1.3 Exploring antecedents of consumer evaluation and consumption of food

The study of food consumption behavior spans many scientific disciplines, from biology, nutrition, medicine, and health sciences via food science and technology to psychology, business research, behavioral science, marketing, sociology, and consumer research (Köster, 2009; Symmank et al., 2017). A core question occupying research into food choice behavior is: “Why does *who* eat *what*,

when, and where?” (Köster, 2009, p. 70). Several different theoretical approaches and models have been developed to answer that question and to explain the reasons and motives behind food consumption behavior. One of the first attempts to develop a summary model in this regard was Pilgrim (1957), who suggested that consumer perception is the main antecedent of food acceptance. Consumer perception is in turn a function of three basic factors: (a) physiological effects of the food, (b) perception of sensory attributes, and (c) influences from the environment (Steenkamp, 1993). Pilgrim’s model has since influenced several subsequent efforts to develop models of determinants of food consumption behavior (Shepherd, 1990; Sijtsema et al., 2002). For an introduction to the early models, see Shepherd and Sparks (1994).

Many of these efforts attempt to integrate the different antecedents and motivations in interdisciplinary conceptual frameworks (e.g., Furst et al., 1996; Köster, 2009; Rozin, 2006). More recently, Stok et al. (2017) introduced what may be the most comprehensive effort on structuring food choice determinants and influencing factors to date, namely the DONE² framework. A recent interdisciplinary review using the DONE framework (Symmank et al., 2017) has demonstrated the vast amount of research on predictors of food decision-making available across a multitude of research disciplines, with individual, psychological predictors having enjoyed the greatest research interest. Another recent review of the many existing conceptual models addressing the antecedents of food choice (Chen & Antonelli, 2020) identifies three main categories, namely *food-related features*, *individual differences*, and *society-related features*. The resemblance to Steenkamp (1993) and others’ taxonomies of *properties of the food*, *person-related factors*, and *environment*, respectively, is apparent. In a similar vein, attempts to synthesize and classify antecedents of functional food behavior have recently been made (Bimbo et al., 2017; Kaur & Singh, 2017; Mogendi et al., 2016). Kaur and Singh (2017) deviated from the tripartite classification of Chen and Antonelli (2020) and Steenkamp (1993) by introducing a fourth category to disentangle personal- from psychological factors. Mogendi et al. (2016) also categorize antecedents into four groups: (a) nutritional knowledge and information, (b) attitude, perceptions, and consumer behavior, (c) price and product characteristics, and (d) socio-demographics. Bimbo et al. (2017) distinguish between only two broad categories: consumer- and product-related characteristics. The core constituents of the categories do, however, overlap to a large extent, and although each model brings new perspectives, the tripartite partitioning into (a) properties with the food product or object, (b) properties with the person engaged in the decision making and consumption process, and (c) external and environmental factors, seems to provide the consistent overarching main levels (e.g., Chen & Antonelli, 2020; Köster, 2009). Table 2 summarizes some of

² Determinants Of Nutrition and Eating.

the most influential models or reviews of food choice and behavior and assigns the antecedents to these three overarching categories. Worth noting is that the boundaries between the three levels are still fuzzy, as pointed out by Steenkamp (1993) almost 30 years ago. For example, Stok et al. (2017) categorize extrinsic and intrinsic product attributes under *environmental, micro-level factors*, while Chen and Antonelli (2020) group social norms under *food-related features*.

Table 2. Summary of interdisciplinary models of determinants of food choice and behavior

Author(s), year	Food-related	Person-related	Environment-related
Pilgrim, 1957	Sensation derived from sensory attributes	Physiological factors and attitudes	Environmental influences and learning effects
Khan & Hackler, 1981	Extrinsic and intrinsic factors	Biological, physiological, and psychological, and personal factors and demographic	Situational, advertising, and season, and cultural, religious, and regional factors
Randall & Sanjur, 1981	Extrinsic and intrinsic factors	Demographic, knowledge/skills, and attitude	Season, urbanization, and family size and composition
Shepherd, 1985	Physical/chemical properties, nutrient content	Perceptions and psychological factors	Social/cultural, availability, price, and brand
Steenkamp, 1993	Physical form, chemical/nutritional composition, sensory perception	Biological and psychological factors, and personality	Sociocultural, economic, and marketing factors
Sijtsema et al., 2002	Product characteristics, production system	Demographic, physiological, and psychological factors, attitudes	Family and society characteristics, consumption moment, time, and place
Köster, 2009	Extrinsic and intrinsic factors	Biological, physiological, and psychological factors	Situational and socio-cultural
Mogendi et al., 2016	Extrinsic and intrinsic factors	Socio-demographic, cognitive, and behavioral factors, and knowledge	
Bimbo et al., 2017	Extrinsic and intrinsic factors	Socio-demographic, knowledge, and lifestyle, and psychological factors	
Kaur & Singh, 2017	Extrinsic and intrinsic factors	Psychological and personal factors (e.g., knowledge, socio-demographics)	Cultural and social factors (e.g., cultural, and social norms, family composition)
Stok et al., 2017	Extrinsic and intrinsic factors	Biological, demographic, psychological, and situational factors	Social and cultural factors, meso-macro environmental factors (e.g., availability, price)
Chen & Antonelli, 2020	Extrinsic and intrinsic factors	Personal-state and cognitive factors (e.g., biology, physiology, and psychology)	Sociocultural factor (e.g., cultural, economic, and political), social and physical environment

Note. The models' different levels or groups of antecedents are rearranged to match a tripartite categorization into food-, person-, and environment-related factors. The category *extrinsic and intrinsic factors* denotes various properties of the food.

Some theories or approaches emphasize properties with the product such as the total food quality model (Grunert et al., 1996) and cue utilization of quality perception processes (Olson & Jacoby, 1972; Steenkamp, 1990) or contextual or environmental factors (Meiselman, 2006; Wansink, 2004). Others highlight food-related lifestyles and values (Brunso et al., 2004a), goals or goal conflicts (Stroebe et al., 2008), mood and emotions (Gibson, 2006; Köster & Mojet, 2015), social norms (Higgs, 2015; Higgs & Thomas, 2016), identity (Conner & Armitage, 1998; Terry et al., 1999), knowledge (Wardle et al., 2000), and habit strength (Verhoeven et al., 2012). More recent work has begun to explore the role of personality traits (Esposito et al., 2021), including impulsiveness or impulse buying tendency (Guerrieri et al., 2007; Verplanken et al., 2005), self-control (Hankonen et al., 2013; Salmon et al., 2014), temporal self-regulation and time perspectives (Dassen et al., 2015; Hall & Fong, 2007), regulatory focus (Pula et al., 2014), and conscious vs. automatic patterns (Bublitz et al., 2010).

Several models or theories have been designed to explain, predict, or change health behavior, including functional food behavior. Health behavior denotes “those personal attributes such as beliefs, expectations, motives, values, and other cognitive elements; personality characteristics; including affective and emotional states and traits; and overt behavior patterns, actions, and habits that relate to health maintenance and wellness, to health restoration, and to health improvement” (Gochman, 1982, p. 169). The core cognitive antecedents of health behavior include attitudes, norms, self-efficacy or perceived behavioral control (PBC), and self-representations (Abraham et al., 1998), many of which are integrated into *social cognition models*.

Social cognition models represent one group of health behavior models “used to help understand, predict and change health-relevant [behaviors]” (Conner & Norman, 1998, p. 179). *Social cognition* is understood as individuals’ sense-making of social situations, the assumption being that “social [behavior] is best understood as a function of people’s *perceptions* [emphasis added] of reality, rather than as a function of an objective description of the stimulus environment” (Conner & Norman, 2015a, p. 7). Influential exemplars include the health belief model (HBM; Janz & Becker, 1984; Rosenstock, 1974), the protection motivation theory (PMT; Maddux & Rogers, 1983; Rogers, 1975), the social cognitive theory (SCT; Bandura, 1986), and the theory of planned behavior (TPB; Ajzen, 1991), as well as its predecessor, the theory of reasoned action (TRA; Fishbein & Ajzen, 1975). These are all motivational models, “designed with a view to identifying the variables that underlie health-related decisions, and to assess their ability to predict [behavior]” (Armitage & Conner, 2000, p. 174). A recent synthesis of the theories and models frequently applied to the study of health behaviors

concludes that the above-mentioned models are among the most frequently used theoretical frameworks (Glanz et al., 2015). The models also share several conceptual similarities, including the role of attitudinal beliefs, beliefs regarding behavioral control or self-efficacy, and normative beliefs (Noar & Zimmerman, 2005). Of the above models, the TPB outperforms the others in predictive ability (Armitage & Conner, 2000). For that reason, the current research employs the TPB as the core theoretical framework. Detailed accounts of the other motivational models' main constituents can be found elsewhere (Abraham et al., 1998; Armitage & Conner, 2000; Conner & Norman, 2015b).

A recent meta-analysis of research employing the TPB to predict or explain food choices (Nardi et al., 2019) demonstrates the model's robustness in a food choice context. The TPB and constructs thereof have frequently been used as (part of the) conceptual frameworks in the study of functional food behavior, in particular behavioral beliefs and attitudinal constructs (Kaur & Singh, 2017; Mogendi et al., 2016). In the TPB, engaging in a behavior is determined by the intention to do so and perceptions about control over the enactment of the behavior. The most proximal antecedents of intention formation are attitude toward performing the behavior, social norms related to performing the behavior, and perceived behavioral control over the enactment of the behavior (Fishbein & Ajzen, 2010/2015). The formation of attitudes, social norms, and PBC hinge upon, respectively, beliefs about the positive and negative outcomes of enacting the behavior (behavioral beliefs), beliefs about what others themselves do or expect you to do (normative beliefs), and beliefs about how easy or difficult it would be to engage in the behavior (control beliefs). In addition to the model's main constructs, the reasoned action approach (i.e., TPB/TRA) acknowledges the role of background factors or individual difference variables responsible for the formation of beliefs, including personality traits and personal values, sociodemographic characteristics, and knowledge and information (Ajzen & Fishbein, 2005).

Within the TPB, both personality traits and personal values are considered background factors that indirectly influence intentions and behaviors through the model's core constructs (i.e., attitude, social norms, and PBC; Ajzen et al., 2018). Background factors are believed to represent the origins of behavioral, normative, and control beliefs that ultimately reflect attitude, social norms, and PBC, respectively. Personality traits and personal values thus represent distal determinants of intention and behavior. Research employing the cognitive hierarchy model (VAB; Homer & Kahle, 1988) or Mowen's (2000) 3-M model of motivation and personality, lends empirical support for the indirect influence of values and traits on behavior through attitudes (Conner & Abraham, 2001; Huynh & Olsen, 2015; Kang et al., 2015; Milfont et al., 2010; Tudoran et al., 2009). Tudoran et al. (2009), for example, employed the VAB in analyzing consumers' evaluation and intention to buy functional food. Their study revealed that attitudes toward functional food completely mediated the relationship

between health value (i.e., importance and concerns about health) and attitude toward a specific functional food product.

1.4 Exploring gaps in explaining evaluation and consumption of functional food

The TPB is considered “the dominant theoretical approach to guide research on health-related [behavior]” (Sniehotta et al., 2014, p. 1) and is frequently employed to predict or explain consumer evaluation and consumption of food (Nardi et al., 2019). Aside from health behaviors, the TPB is also among the most used theoretical frameworks to explain or predict a number of other behaviors, including pro-environmental behaviors (Yuriev et al., 2020) and socially responsible consumer behaviors (Han & Stoel, 2017), to name only a few. The TPB is used because it offers great explanatory power in a parsimonious way and is generalizable across behavioral domains. It further provides opportunities for extensions and the inclusion of background factors or external variables, including personality traits and personal values. Although functional foods are popular products around the world, less is known about Norwegian consumers’ motivation and use of such products. Hence, this research considers the TPB framework as a relevant starting point for studying antecedents of consumer evaluation and consumption of functional food in Norway. The current research further considers temporal influences on consumption behavior and specifically argues for the relevancy of future time perspective in explaining consumption of functional food. Finally, the roles of personality traits and personal values in explaining behavioral tendencies toward functional food is addressed. In the following, arguments on how this thesis contributes to the existing TPB literature, as well as to the consumer food psychology literature, in exploring antecedents of evaluation and consumption of functional food are put forth.

The TPB is an extension of the TRA (Fishbein & Ajzen, 1975) “designed to predict and explain human behavior in specific contexts” (Ajzen, 1991, p. 181). Several studies have employed the TPB or constructs thereof to explain consumers’ behavioral tendencies toward functional foods (Nguyen et al., 2020; O’Connor & White, 2010; Patch et al., 2005; Xin & Seo, 2020). For example, Patch et al. (2005) and Hung et al. (2016) establish a strong relationship between attitude and intention. In the studies by O’Connor and White (2010) and Nguyen et al. (2020), both attitude and social norms influence intention formation, and Xin and Seo (2020) find that attitude and PBC both influence purchase intention.

Further extensions to the original TPB model have been proposed, including alterations pertaining to the structure and operationalization of its core elements (i.e., attitude, social norms, and PBC; Ajzen et

al., 2018). Briefly, it is by now recognized that both affective and cognitive components should be included to the attitude construct, and that both injunctive and descriptive norms are needed to properly address the social norms construct. Similarly—although associated with somewhat more controversy—the PBC construct should incorporate measures of both self-efficacy and control. Accordingly, the current research incorporates these considerations in the measures of attitude (Ch. 1.6.2), social norms (Ch. 1.6.3), and PBC (Ch. 1.6.4). Paper 1 also includes hedonic and utilitarian eating values as background factors hypothesized to influence attitude formation. Eating values constitute (domain-specific) motivational considerations underlying food choice and consumption behavior (Lusk & Briggeman, 2009; Tudoran et al., 2009). The assumption is that utilitarian (e.g., importance of avoiding health issues) and hedonic (e.g., importance of pleasure) eating values are differentially associated with attitude toward the consumption of functional food. Paper 3 further builds on the roles of personal values in explaining consumption behavior, introducing health importance, weight management concern, and convenience orientation, in combination with hedonic eating values, as bases for segmenting and profiling Norwegian consumers.

Personality traits and their influence on food choices and consumption have lately gained momentum in research (Gustavsen & Hegnes, 2020; Keller & Siegrist, 2015; Machado-Oliveira et al., 2020; Pfeiler & Egloff, 2020). Some recent reviews (Esposito et al., 2021; Lunn et al., 2014) underpin the notion that personality traits are reliable predictors of dietary and health behavior patterns, and conscientiousness in particular shows consistent associations with various dietary behaviors and outcomes. Paper 2 addresses a gap in consumer research on functional food and tests the associations between the big five personality traits (i.e., openness to experience [hereafter *openness*], conscientiousness, extraversion, agreeableness, and neuroticism) and consumption of functional foods. Aside from the big five personality traits, research has also established relationships between functional food consumption and other traits, such as food neophobia (Labrecque et al., 2006; Stratton et al., 2015), self-control (Barauskaite et al., 2018; Neupane et al., 2019), and consumer innovativeness (Huotilainen et al., 2006). Paper 3 incorporates self-control and consumer innovativeness, domain-specific to food choice behavior, as individual difference constructs hypothesized to differentiate between consumer segments.

Another individual difference construct that has enjoyed increasing research attention in the domain of food consumption is future time perspective (Olsen & Tuu, 2021; Onwezen et al., 2016; van Beek et al., 2013). Engaging in health-promoting behaviors has long-term beneficial consequences and hence is suggested to be related to having a future time perspective (Hall et al., 2015; Sweeney & Culcea, 2017). Future time perspective has also been consistently associated with conscientiousness and proposed to act as a mediator between broader personality traits (e.g., big five) and health-related

behaviors and outcomes (Kooij et al., 2018). The consistent link between future time perspective and health outcomes has been demonstrated in a recent meta-analysis (Andre et al., 2018). Paper 2 considers time perspective as a mediating mechanism through which the big five personality traits influence functional food consumption behavior and tests both direct and indirect relationships between the constructs. Associations between these constructs have not, to the author's knowledge, been established before in a functional food context.

Most social cognition models such as the TPB are predominantly variable-centered approaches to understanding social phenomena. Variable-centered approaches “assume that all individuals from a sample are drawn from a single population for which a single set of “averaged” parameters can be estimated” (Morin et al., 2018, p. 804). Complementary to the variable-centered approach, employed to investigate relationships *between* variables or constructs, is the *person-centered approach* (Fisher & Robie, 2019; Howard & Hoffman, 2018; Morin et al., 2018). Person-centered approaches “consider the possibility that the sample might include multiple subpopulations characterized by different sets of parameters” (Morin et al., 2018, p. 804). In marketing, person-centered approaches are widely used to decompose markets into fewer, more homogenous market segments to improve the effects of different marketing strategies, such as marketing communication, product development, distributional strategies, and pricing (Steenkamp & ter Hofstede, 2002; van Raaij & Verhallen, 1994).

Personality (trait) research employing variable-centered approaches looks to establish associations between traits and focal outcomes. Personality, however, represents the intraindividual organization of experiences and behaviors (Asendorpf, 2002), or the combination of traits within an individual. As such, the assumption underlying the person-centered approach is that the intraindividual combinations of traits, or the patterns in personality structure within individuals, partitions people into homogeneous personality types, consumer profiles, or subgroups of people (Asendorpf, 2002; Rammstedt et al., 2004). Hence, person-centered approaches constitute “a rich complement to traditional variable-centered methods” (Morin et al., 2018, p. 804). Some previous studies on functional food integrate traits, values, attitudes, habits, and other motivational or behavioral constructs to differentiate consumers in subgroups employing clustering techniques (e.g., Annunziata & Pascale, 2009; Ares & Gámbaro, 2007; Szakály et al., 2012). The person-centered approach “is appropriate for investigating research questions and hypotheses aimed at (a) categorizing subjects into common subpopulations based on substantive variables and (b) understanding the relations of these subpopulations with predictors, correlates, or outcomes” (Howard & Hoffman, 2018, pp. 848–850). Paper 3 integrates and combines individual differences in personality traits and personal values context-specific to food consumption behavior and employs the person-centered approach (a) to determine the existence of

consumer profiles and (b) to establish whether and how different profiles are related to attitudes and behavioral tendencies with respect to the consumption of functional food.

1.5 Overall conceptual framework for this thesis

The overall aim of this dissertation is to improve the theoretical and empirical understanding of consumers' behavioral tendencies toward functional food consumption. The main purpose is to provide a deeper understanding of antecedents that are relevant for explaining consumer evaluation of functional food and consumption behavior. The theoretical starting point is the TPB, a model that simultaneously represents both a comprehensive and a parsimonious structure for the study of behavioral antecedents. In general, it follows a trait/value–attitude–intention/behavior causal framework (Homer & Kahle, 1988) wherein the more abstract personality traits and personal values are held to influence attitude formation and subsequently the formation of intentions, which ultimately impact behavioral decisions.

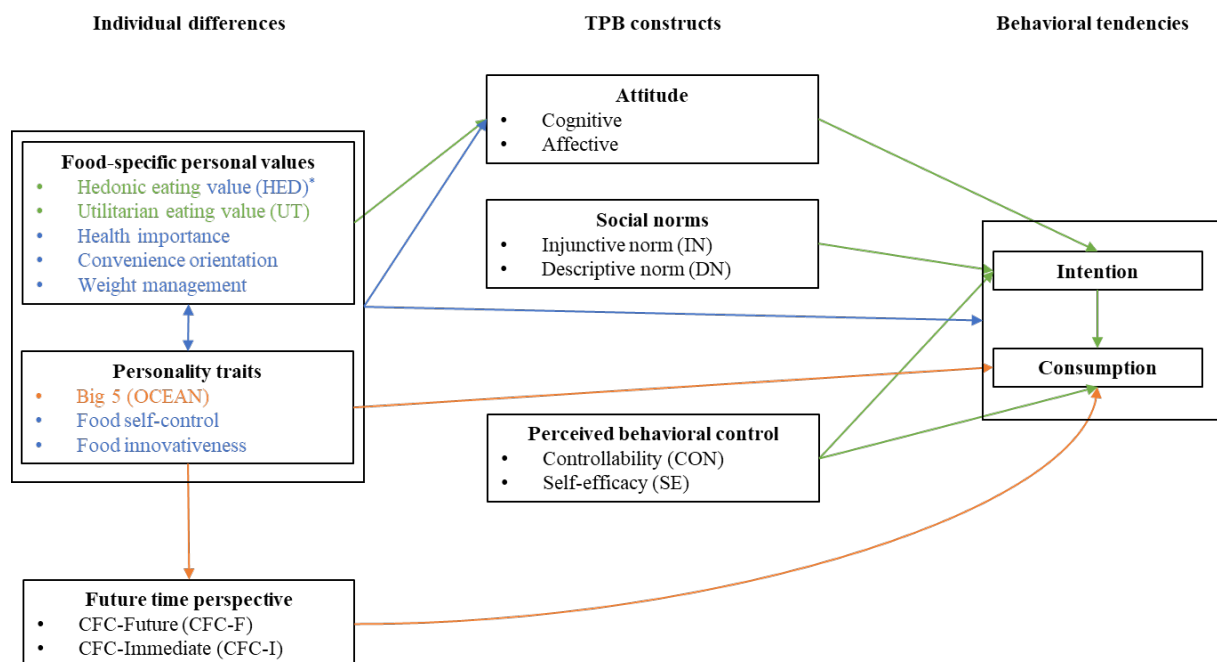
Specifically, the following objectives are pursued:

- a. To test and establish whether an extended version of the TPB that incorporates separate constructs of self-efficacy and descriptive norm, as well as hedonic and utilitarian eating values, as antecedents of attitude formation, provides superior explanatory ability over the basic TPB;
- b. To investigate and establish the interrelationships between the big five personality traits and future time perspective and test their roles in explaining functional food consumption;
- c. To investigate and discuss whether consumer profiles based on individual, food-related values and traits are differentially related to consumer evaluation and consumption of functional food;
- d. To combine SEM and clustering techniques to achieve a better understanding of whether and how individual differences are related to the evaluation and consumption of functional foods; and
- e. To explore antecedents of functional food consumption behavior in a representative sample of Norwegian consumers.

Figure 1 depicts the conceptual model used to address the above-stated objectives. All of the associations between the constructs used in this thesis are included in the model. Briefly, paper 1 specifies and tests an extended TPB model (green-colored one-headed arrows). Paper 2 investigates

the roles of the big five personality traits and future time perspective in explaining functional food consumption behavior (orange-colored one-headed arrows). Finally, paper 3 combines domain-specific personality traits and personal values in segmenting consumers and tests whether the segments have different attitudes, intentions, and consumption patterns (blue-colored one-headed arrows). Worth noting is the blue-colored double-headed arrow between traits and values, which denotes a nondirectional relationship between the constructs. The point here being that paper 3 does not presume and test a causal relationship from traits to values (cf. Homer & Kahle, 1988), but rather combines the two to form the basis for segmenting consumers. The model's constructs are presented and described in more detail in the following sections.

Figure 1. Conceptual model



Paper 1: SEM (extended TPB)
 Paper 2: SEM (big 5 → CFC → consumption)
 Paper 3: Cluster analysis (consumer profiles)

* Hedonic eating value included in both paper 1 and paper 3
 → Denotes directional relationships
 ↔ Denotes nondirectional relationships

1.6 Extending the theory of planned behavior

1.6.1 Behavioral tendencies: Intention and consumption

According to the TPB, behavior is guided by behavioral, normative, and control beliefs. Behavioral beliefs consider the likely positive and negative consequences of performing (or not performing) the behavior. Normative beliefs concern the expectations of others regarding performance of the behavior,

while control beliefs represent beliefs about the factors that may go against or further performance of the behavior (Ajzen, 2002a). These beliefs aggregate into the attitude toward performing the behavior, social norm (perceived social pressure), and PBC, respectively. The basic assumption is that the immediate antecedents to actual performing a given behavior is the intention to perform it and PBC. The behavior in question throughout this dissertation is defined as *consumption of functional foods on a regular basis*. As a consequence, and in accordance with the principle of compatibility (Ajzen, 1988), all TPB constructs are operationalized with the behavioral definition in mind, for example *attitude toward the consumption of functional foods on a regular basis*.

On a cautionary note, the current research measured behavior with a single item that reflects past consumption of functional foods. In combination with self-reports and a cross-sectional research design, the model is better conceptualized as an explanatory rather than a predictive model. Although retrospective behavior can be a satisfactory proxy for future behavior (Jaccard & Blanton, 2005), cross-sectional data remain unsuitable for causal inferences. Past behavior can also influence future behavior, either directly or indirectly, thus altering the causal direction proposed in the TPB (Ajzen et al., 2018; Morwitz & Munz, 2021). The use of cross-sectional research designs and self-reports when employing social cognition models, such as the TPB, to predict or explain health behaviors, including food consumption behavior, is widespread, however (Nardi et al., 2019; Noar & Zimmerman, 2005). Using single-item measures of retrospective consumption behavior is also common (e.g., Dunn et al., 2011; Goetzke et al., 2014; Olsen et al., 2007).

Intentions 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” (Ajzen, 1991, p. 181). They operate as a motivational force that influences the likelihood of performing a given behavior (Morwitz & Munz, 2021). The underlying assumption is that people engage in intended behaviors and do not engage in unintended behaviors (Sheeran, 2002). No matter how intuitive and appealing this notion may sound, the relationship between intention and behavior, however, is not straightforward. This inconsistent relationship is called *the intention–behavior gap* and, according to a synthesis of relevant research on the topic, intention translates into action only one-half of the time (Sheeran & Webb, 2016). The magnitude of the intention–behavior gap for dietary behaviors, which is affected by the complex nature of food consumption (Dunn et al., 2011), is moderate (Conner et al., 2002; McEachan et al., 2011). Paper 1 hypothesized a positive relationship between intention and consumption of functional foods (retrospective behavior) and was intended to reflect the extent of planning, expectation, and intent toward the regular consumption of functional food.

1.6.2 Evaluation: Cognitive and affective attitudes

Attitude is “a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor” (Eagly & Chaiken, 1993, p. 1). The entity, or attitude object, in question can take the form of abstract ideas, other people, physical objects, or concrete behaviors. The attitude construct has enjoyed a multitude of definitions, conceptualizations, and operationalizations since its introduction to the social sciences almost a century ago (Allport, 1935; Jung, 1923/1971). Most, if not all, attitude scholars agree that evaluation is the core of attitudes: “The study of attitudes is the study of evaluations” (Albarracín & Shavitt, 2018, p. 300). Evaluation, attitude object, and tendency are three essential features of attitude: “Evaluation refers to all classes of evaluative responding, whether overt or covert, or cognitive, affective, or behavioral”, directed toward an attitude object (Eagly & Chaiken, 2007, p. 583). Tendency refers to the past experiences with the attitude object and denotes whether an individual is more or less likely to evaluate the attitude object in accordance with prior experiences.

Attitudes can be formed based solely on cognitive (beliefs and thoughts), affective (feelings and emotions), or behavioral (intentions and overt behavior) grounds or any combination of these evaluative aspects. The two dimensions of cognition and affect can differentially predict behavior (Lawton et al., 2009; Millar & Tesser, 1986), thus underpinning the importance of considering both in conceptualizing attitudes. Related to food attitudes, the affective dimension reflects the sensations derived from experiencing a food product (e.g., its sensory appeal) while the cognitive dimension reflects considerations of its functions (e.g., its nutritional composition; Voss et al., 2003).

An important consideration when employing the TPB is the principle of compatibility (Ajzen, 1988). Briefly, it posits that the behavior in question should be explicitly defined in terms of its target, action, context, and time frame and that all of the other TPB constructs are defined in corresponding terms. For example, the current research defined the behavior as the consumption (action) of functional foods (target) on a regular basis (time frame), subsequently measuring intention, attitude, social norms, and PBC in a similar manner (e.g., “My eating functional foods on a regular basis would be ...”). The principle of compatibility suggests that the behavioral definition defines how the other constructs are to be operationalized (Ajzen, 2020). Relatedly, attitudes also vary in their level of specificity, from narrow to broad bandwidth, which influences their predictive accuracy. Consider for example an attitude toward buying a specific product (e.g., buying a can of Coca Cola). The attitude will likely predict the corresponding behavior (i.e., actually buying a can of Coca Cola) more accurately than a broad bandwidth attitude, such as attitude toward buying a soft drink (Ajzen, 2012).

Attitude is usually strongly associated with intention to consume or buy various foods (McDermott, Oliver, Simnadis, et al., 2015; McDermott, Oliver, Svenson, et al., 2015; Povey et al., 2000b), including functional foods (for a review, see Kaur & Singh, 2017). Patch et al. (2005), for example, found attitude to be the only significant predictor of intention to consume omega-3-enriched foods. Similarly, Hung et al. (2016) found that attitude was the most important determinant for intention to purchase a new functional meat product. Szakály et al. (2019), employing a modified Munene model, demonstrated that attitude toward functional food was the best predictor of consumer willingness to pay. The list of studies supporting the significant role of attitude in predicting or explaining intention to consume or buy, or actual consumption or willingness to pay for functional foods is continuously growing. Paper 1 considers both affective and cognitive components of attitude and tests the hypothesis that attitude is positively associated with intention to consume functional food regularly. Paper 3 rather operationalizes attitude as a global construct (e.g., negative–positive, bad–good).

1.6.3 Social norms: Injunctive and descriptive

Social or subjective norms embody the perceived social pressure or expectations of others regarding whether to engage in a particular behavior or not. They are “rules and standards that guide and constrain social behavior” (Melnyk et al., 2019, p. 6). Social norms and their impact on human behavior has enjoyed longstanding attention, but not without controversies. Cialdini et al. (1990), for example, introduce two opposing views: on the one side are advocates supporting the role of social norms in predicting and properly understanding human behavior, while on the opposite side are those that are resistant, arguing that the concept of social norms is vague and ill-suited to empirical testing. According to Cialdini and colleagues (1991; 1990), a central explanation for why there have been so many discrepancies rests on definitional ambiguity—the term social norms can have several different meanings. Cialdini and Trost (1998) argue that social norms represent (a) general, societal expectations for our behavior; (b) expectations of valued others (e.g., family or friends) for our behavior (i.e., injunctive norms); (c) our own expectations for our behavior (i.e., personal norms); and (d) standards that develop out of our observations of others’ behavior (i.e., descriptive norms). A recent meta-analysis (Melnyk et al., 2019) demonstrates the differential effect of descriptive and injunctive norms on behavior: descriptive norms have a larger effect and “affect behavior primarily directly, whereas the effect of injunctive norms relies on the indirect effect through intentions” (p. 13).

Within a TPB framework, social norms have traditionally been conceptualized as injunctive norms (i.e., “what significant others think the person ought to do”; Ravis & Sheeran, 2003, p. 219). In their meta-analysis, Armitage and Conner (2001) conclude that the social norm construct exhibits the

weakest relationship to intention. However, they posit that measurement issues and the way social norms are conceptualized (i.e., injunctive norms) are central in explaining the construct's weak association with intention. A subsequent meta-analysis (Rivis & Sheeran, 2003) thus explored the additional effect of descriptive norms and demonstrated how the construct significantly contributes to explaining variance in intention, over and above the TPB main constructs. More recently, Manning (2009) investigated the effects of injunctive and descriptive norms across behaviors in a meta-analytical synthesis, yielding further support for the larger effect of descriptive norms vis-à-vis injunctive norms.

The act of eating or choosing what food to eat is susceptible to social influences. For example, Higgs (2015) explored how social norms affect eating behaviors. She posits that the presence of others has a powerful effect on behavior "because following (or not following) norms is associated with social judgements" (p. 42). Modeling, or the effect of the presence of others when eating (Herman et al., 2003; Vartanian et al., 2015), is a related concept to descriptive norms. Both concepts involve observing others' behavior as a means of deciding what is normal conduct. Vartanian et al. (2015) conducted a meta-analysis of research on modeling of food intake, demonstrating a strong modeling effect "such that participants ate more when their companion ate more, and ate less when their companion ate less" (p. 119). Robinson et al. (2014) reviewed studies that experimentally manipulated information about eating norms and found a consistent effect on eating behavior. They concluded that providing information suggesting that other people are eating healthily influences both the quantity and types of food people choose to consume.

Previous consumer research on functional food has explored the role of social norms on behavior. For example, O'Connor and White (2010) employed the TPB to study non-users of functional food and their willingness to consent to a free trial of an unspecified functional food which involved consuming the product every day over the next two months. Social norms (i.e., injunctive norms) were significantly associated with intention. Another study (Patch et al., 2005), also using the TPB and injunctive norms, did not find a significant association with intention. Yet another, more recent study (Nguyen et al., 2020) demonstrates significant associations of injunctive norms and both attitude and intention toward the purchase of functional yoghurt among Vietnamese consumers. Salmani et al. (2020) combined measures of injunctive and descriptive norms into a summary construct labeled subjective norms and found a significant association with the use of vitamin-enriched foods. Rezai et al. (2014), using constructs from both the HBM and the TPB, found that injunctive norms "have a direct influence on consumer intention to accept synthetic functional foods" (p. 30). Wang and Chu (2021) proposed a mediation model to study the influence of descriptive and injunctive norms on intention to purchase functional foods. Both descriptive and injunctive norms were indirectly related

to purchase intention as fully mediated by attitude. Moodi et al. (2021) found no evidence of a relationship between social norms and consumption of functional dairy products in their multiple logistic regression model. However, their social norms construct was made up of six items wherein only one item somewhat reflects descriptive norms (“Among my friends are those who eat functional foods”).

Based on the relevant literature above, it is evident that the conceptualization, measurement, and influence of social norms in consumer studies involving functional food behavior varies to a large extent. In paper 1, both descriptive and injunctive norms were included. Descriptive norms were conceptualized as perceptions about whether significant others and people “like me” engaged in regular consumption of functional food. Injunctive norms represented perceptions about whether significant others would want or expect one to engage in regular consumption of functional food. It is hypothesized that both descriptive and injunctive norms are positively associated with intention to regularly consume functional food. Aside from Wang and Chu’s study (2021), no prior research of which I am aware has conceptualized and tested the concurrent influence of both descriptive and injunctive norms on intentions toward and consumption of functional food.

1.6.4 Perceived behavioral control: Controllability and self-efficacy

Perceived behavioral control (PBC) refers to people’s perception of the ease or difficulty of performing a particular behavior and was added to the TRA “to deal with situations in which people may lack complete volitional control over the behavior of interest” (Ajzen, 1991; 2002a, p. 666). Since introducing the construct to the TPB, its measurement and conceptualization have been heavily debated. For instance, the concept of PBC bears much in common with similar constructs (e.g., barriers) from other social cognitive models, self-efficacy in particular. Ajzen (2002b) contends that PBC is a superordinate construct, overarching the two lower-level constituents of self-efficacy and controllability. While self-efficacy is held to be internally derived, reflecting the capabilities and the confidence in one’s ability to perform a behavior, controllability (or perceived control over behavior) deals with externalities such as resources and availability (Armitage & Conner, 1999; Terry & O’Leary, 1995). Thus, perceptions of control entail both internal (covert) and external (overt) control mechanisms. In a recent review of the theorization, conceptualization, and operationalization of behavioral control, Lim and Weissmann (2021) present *the theory of behavioral control* which encompasses two categories of behavioral control, namely covert (i.e., the power of control is internal) and overt (i.e., the power of control is external) behavioral control. The theory highlights the

importance of considering both internal and external control mechanisms to better tackle the intention–behavior gap.

An early review of research employing the TPB with health-related behaviors (Godin & Kok, 1996) concludes that PBC has significant predictive abilities on intention, similar in magnitude to attitude. PBC also adds to the prediction of behavior alongside intention in several instances. Studies conceptualizing self-efficacy and controllability as two distinct constructs usually demonstrate a stronger relationship between self-efficacy and intention and self-efficacy and attitude compared to controllability (Armitage & Conner, 2001; Manstead & van Eekelen, 1998; Terry & O’Leary, 1995). Research on eating or dietary behaviors finds similar effects (Armitage & Conner, 1999; Povey et al., 2000a).

In predicting or explaining functional food consumption behavior, O’Connor and White (2010) used a single-item measure of self-efficacy and demonstrated its insignificant relationship to the willingness to try functional food. Patch et al. (2005) also did not find PBC to exert a significant influence on intention to consume foods with added omega-3, and in a similar vein Salmani et al. (2020) could not provide evidence that PBC influenced consumption of vitamin-enriched foods. Rezai et al. (2014), conceptualizing PBC as intention to and confidence in buying functional food if the price is reasonable/affordable, add to these studies displaying an insignificant association with intention to accept synthetic functional foods. One study that did find PBC influencing intention to buy functional food is that of Xin and Seo (2020). In their study of Chinese consumers’ intention to buy Korean functional foods, PBC was an equally strong predictor as attitude. Two studies by Cox and colleagues (Cox & Bastiaans, 2007; Cox et al., 2004) provide empirical evidence of the association between self-efficacy and intention to consume and buy functional food using the PMT.

The mentioned studies on functional food behavior vary largely in how PBC is conceptualized and measured, which makes it somewhat difficult to generalize over the findings. Paper 1 specifically conceptualized PBC as self-efficacy and controllability (i.e., perceived control over behavior) to investigate the two concepts’ respective and simultaneous influence on intention and consumption behavior. It is hypothesized that self-efficacy and controllability are positively associated with both intention and consumption behavior. To my knowledge, no previous study has incorporated both constructs within a TPB framework in trying to explain or predict behavioral tendencies toward functional food consumption.

1.7 Individual differences

Two concepts with much in common are personality traits and personal values. A meta-analysis of the correlations between the two concepts (Fischer & Boer, 2015, p. 491) provides “strong support for systematic linkages between personality and broad value dimensions.” However, Schwartz (2012) contends that people who exhibit a trait (e.g., behaving obediently) do not necessarily value the corresponding goal (valuing obedience), suggesting that behavioral dispositions need not be guided by one’s desirable goals or value positions. One of the suggested differences between traits and values is “that traits are descriptive variables whereas values are motivational variables” (Parks-Leduc et al., 2015, p. 5). Put differently, traits are descriptions of observed patterns of behavior while values are criteria that individuals use to judge the desirability of behavior, people, and events (Bilsky & Schwartz, 1994, p. 165). Another proposed difference is their supposed origin—traits are innate, while values are learned beliefs “about preferred ways of acting or being” (Olver & Mooradian, 2003, p. 111).

Time perspective is another individual difference concept with linkages to personality traits. The term comprises temporal considerations influencing behavior and entails the degree to which people focus on past, present, and/or future time frames (Mohammed & Marhefka, 2020). Perhaps the main similarity between personality traits and time perspective is their stable, cross-situational influence on behavior (Kairys & Liniauskaite, 2015). There are, however, many different approaches to time perspective (for a discussion, see Kooij et al., 2018). Some approaches consider time perspective as a form of personality (Kairys & Liniauskaite, 2015; Zimbardo & Boyd, 1999), while others define the term as a cognitive-motivational construct (Shipp et al., 2009). Consideration of future consequences (CFC; Strathman et al., 1994) is considered to be an alternative to the Zimbardo time perspective inventory (ZTPI; Zimbardo & Boyd, 1999) and is here categorized under personality traits. A thorough introduction to personality traits, time perspective, and personal values immediately follows.

1.7.1 Personality traits

Personality traits are “abstract potentials, hypothetical psychological features of the individual that, over time and in specific situations, come to be manifested in concrete realizations” (McCrae & Sutin, 2018, p. 152). They represent the latent, hypothetical characteristics of an individual “that exerts pervasive influence on a broad range of trait-relevant responses” (Ajzen, 2005, p. 2). Individual differences in personality describe broad behavioral tendencies associated with future behavior and behavioral outcomes (Baumert et al., 2017).

Personality traits can be conceptualized along a continuum from narrow or concrete to broad or abstract. The five-factor model of personality (FFM; McCrae & Costa, 1997; McCrae & John, 1992) is one of the most abstract and frequently used conceptualizations of personality (Roccas et al., 2002). The five factors represent the *big five* personality traits openness, conscientiousness, extraversion, agreeableness, and neuroticism. The big five traits can also be organized within a personality hierarchy, with narrower traits or facets combining to define the big five traits (Costa & McCrae, 1995). For example, the NEO personality inventory (NEO-PI; Costa & McCrae, 1985) and its revised version (NEO-PI-R; Costa & McCrae, 1992) use six more specific facets representing each of the five broad traits (or domains) of personality. Examples of narrower personality traits with relevance for food consumption behavior include impulsiveness (a facet of neuroticism), self-discipline (a facet of conscientiousness), and aesthetics (a facet of openness; Elfhag & Morey, 2008; Goldberg & Strycker, 2002; Terracciano et al., 2009).

One rationale for subdividing traits into narrower facets is to capture several aspects of each broad trait: “Intellectual curiosity, need for variety, and aesthetic sensitivity all concerned some aspect of experiencing the world, and thus belonged in the domain of [openness]” (Costa & McCrae, 1995, p. 23). Narrower facets also have the ability to better predict specific behavior compared to broader traits (Paunonen & Ashton, 2001). The FFM is not, however, the only representation of personality (traits). For example, Ashton and Lee (2001, 2007) argue for six broad traits in their HEXACO model of personality by adding the dimension honesty-humility to the mix.

It is also possible to identify other, more domain-specific facets or traits such as food neophobia (Pliner & Hobden, 1992), variety-seeking tendency (van Trijp & Steenkamp, 1992), consumer innovativeness (Goldsmith & Hofacker, 1991), and self-control (Tangney et al., 2004). In a similar vein as the principle of compatibility, the correspondence between global traits (Epstein, 1979; Saucier & Goldberg, 2003) and specific behavior is often weak and highly inconsistent. This is where domain-specific traits or facets offer enhanced predictive ability (Goldsmith et al., 1995; van Raaij & Verhallen, 1994). The current research incorporates the big five personality traits, in addition to food self-control (Honkanen et al., 2012; Tangney et al., 2004) and food innovativeness (Bartels & Reinders, 2011), as background factors or antecedents of evaluation and consumption of functional food.

The big five personality traits

The dominant representation of personality is the FFM (McCrae & Costa, 1997) which represents the big five domains of *openness*, *conscientiousness*, *extraversion*, *agreeableness*, and *neuroticism*

(acronym OCEAN). Openness represents imagination, curiosity, and creativity (Goldberg, 1992) and describes “the breadth, depth, originality, and complexity of an individual’s mental and experiential life” (John et al., 2008, p. 120). Conscientiousness “facilitates task- and goal-directed behavior” including thinking before acting and delaying gratification (John et al., 2008, p. 120). Conscientious people are organized, dutiful, and responsible (Goldberg, 1992; John & Srivastava, 1999) and “stay healthier, thrive, and live longer” (Friedman & Kern, 2014, p. 731). Extraversion involves sociability, enthusiasm, and adventurousness (John & Srivastava, 1999) and implies “an energetic approach toward the social and material world” (John et al., 2008, p. 120). Agreeableness represents trustfulness, fairness, and altruism (Goldberg, 1992; John & Srivastava, 1999). Finally, neuroticism represents insecurity, feeling of guilt, and tensivity (Goldberg, 1992).

A recent review of the associations between personality traits and dietary choices (Esposito et al., 2021) supports the notion that personality traits constitute reliable predictors of dietary and health behavior patterns. For example, the review concludes that high neuroticism is associated with unhealthy dietary habits, while low neuroticism, high openness, high agreeableness, high extraversion, and high conscientiousness are related to healthier dietary patterns (e.g., the increased consumption of fruit and vegetables). Another review (Lunn et al., 2014, p. 406) suggests that “higher Openness and Conscientiousness predict healthier dietary intake and that higher Conscientiousness predicts compliance to desirable social and health behaviors.” The associations between dietary choices and personality traits have been frequently supported (Bogg & Roberts, 2004; Carrillo et al., 2012; Goldberg & Strycker, 2002; Keller & Siegrist, 2015; Pfeiler & Egloff, 2020). To the author’s knowledge, no previous research has investigated the associations between the big five personality traits and consumption of functional food (in Norway). Paper 2 therefore tests the roles of the big five personality traits in explaining the consumption of functional foods. Based on the reviewed associations between personality traits and eating patterns, and the assumption that functional food consumption represents a health behavior, the following hypotheses are proposed:

- Traits openness, conscientiousness, extraversion, and agreeableness are positively associated with functional food consumption.
- Trait neuroticism is negatively associated with functional food consumption.

According to the five factor theory (FFT; McCrae & Sutin, 2018), personality traits are basic tendencies that cause characteristic adaptations (beliefs, attitudes), which in turn cause behaviors. Otherwise put, personality traits influence behavior indirectly through more proximal determinants, including motives and goals, “and many other aspects of human individuality that speak to motivational, social–cognitive, and developmental concerns” (McAdams & Pals, 2006, p. 208). This

notion is analogous to the TPB, which posits that personality traits affect behavior indirectly through the model's core constructs (e.g., attitudes).

Domain-specific self-control and innovativeness

Traits that represent narrower life domains such as those pertaining to health or eating resemble global traits in that they are “abstract potentials, hypothetical psychological features of the individual that, over time and in specific situations, come to be manifested in concrete realizations” (McCrae & Sutin, 2018, p. 152). The main difference lies in domain-specific traits being context-dependent, which means that they manifest in concrete realizations *within the particular domain of interest*. Paper 3 introduces two such domain-specific traits, *food self-control* and *food innovativeness*, which constitute two of six constructs used as segmentation bases. Both constructs are based on the theoretical concepts of global self-control (Tangney et al., 2004) and consumer innovativeness (Bartels & Reinders, 2011; Roehrich, 2004), respectively.

Self-control entails “the capacity to alter or override dominant response tendencies and to regulate behavior, thoughts, and emotions” (de Ridder et al., 2012, p. 77). Failure to enact self-control is “the inability to make decisions and act in a manner consistent with one's global goals and values” (Fujita, 2011, p. 352). In a food (choice) context, self-control has been defined as “consumers' choice to refrain from hedonic consumption” (Vosgerau et al., 2020, p. 181), and the construct is highly relevant for understanding food consumption behavior (de Ridder et al., 2012; Tangney et al., 2004). Gillebaart et al. (2016) demonstrated that individuals with high (vs. low) levels of self-control solved food-evoked response conflicts faster (vs. slower), suggesting that the experienced response conflicts were smaller for people with high levels of self-control. Rather than using general self-control, Haws et al. (2016) recommend the use of domain-specific self-control scales when studying outcomes in a particular domain owing to their enhanced predictive validity. The current research introduced *food self-control* as people's ability to control and manage their eating habits (Honkanen et al., 2012; Tangney et al., 2004). It entails that high (vs. low) levels of self-control should promote healthy (vs. unhealthy) consumption. The reason for including food self-control is that consuming functional food is a means of healthy eating, and the level of food self-control influences and contributes to explaining individual differences in functional food consumption.

Consumer innovativeness is “the propensity of consumers to adopt new products” (Hauser et al., 2006, p. 689) or “the predisposition to buy new and different products and brands rather than remain with previous choices and consumption patterns” (Steenkamp et al., 1999, p. 56). Consumer innovativeness is commonly conceptualized along three levels of abstraction, namely innate innovativeness, domain-

specific innovativeness, and innovative behavior (Bartels & Reinders, 2011). Innate innovativeness is the most abstract conceptualization, treating consumer innovativeness as a generalized personality trait that every individual possesses along a continuum from low to high (Bartels & Reinders, 2011; Midgley & Dowling, 1978). Innate innovativeness is frequently associated with new product adoption or innovative behavior, intention to purchase or use, and attitude toward a product or brand (Bartels & Reinders, 2011), and with personality traits like optimum stimulation level, extraversion, and impulsivity (Steenkamp et al., 1999). Innovative behavior (also labeled actualized innovativeness) represents consumer innovativeness on the least abstract level and entails both the acquisition of new products (or adoptive innovativeness) and information-seeking behavior (or vicarious innovativeness) (Bartels & Reinders, 2011; Hirschman, 1980; Steenkamp & Baumgartner, 1992). The midlevel conceptualization of consumer innovativeness is domain-specific innovativeness, which “reflects the tendency to learn about and adopt new products within a specific domain of interest” (Bartels & Reinders, 2011, p. 604; but see also Goldsmith & Hofacker, 1991; Midgley & Dowling, 1978). Domain-specific innovativeness is demonstrated to outperform both innate and actualized innovativeness in terms of predictive validity (Roehrich, 2004), and the construct has frequently been found to correlate with product usage, involvement, and knowledge, attitude, and behavioral intentions (Araujo et al., 2016; Bartels & Reinders, 2011), as well as being linked with willingness to try and use functional foods (Huotilainen et al., 2006). A closely related phenomenon to consumer innovativeness is variety-seeking tendency, or the intrinsic desire for variety, which reflects “the tendency of individuals to seek diversity in their choices of services or goods” (Kahn, 1995, p. 139; see also van Trijp & Steenkamp, 1992). This thesis approaches a domain-specific conceptualization of *food innovativeness*, combining the theoretical constructs of consumer innovativeness and variety-seeking tendency to represent the tendency to seek both diversity and novelty in food choices. The assumption is that functional food—a relatively new and ambiguous food category—will attract attention from food innovators and variety-seekers.

1.7.2 Future time perspective: CFC

Time perspective is “the totality of the individual’s views of his [or her] psychological future and psychological past existing at a given time” (Lewin, 1951, p. 75), or “people’s psychological sense of time” (Baird et al., 2021, p. 233). It is an umbrella term comprising other time-related concepts such as time attitude (Nuttin, 1985/2014), temporal focus (Shipp & Aeon, 2019), time orientation (Zimbardo & Boyd, 1999), and CFC (Strathman et al., 1994). Future orientation is generally thought “to be the most relevant dimension of time perspective for understanding health behavior” (Hall et al., 2015, p. 339). The current research focuses largely on the *future time perspective*, or “The extent to

which people consider and/or devote their attention towards their future” (Baird et al., 2021, p. 238; Table 1), in contrast to a present-orientation or present time perspective (Strathman et al., 1994). Being future oriented is associated positively with self-control (e.g., Barber et al., 2009; Dreves & Blackhart, 2019; Price et al., 2017) and negatively with consumer innovativeness (Merchant et al., 2014). Steenkamp et al. (1999) also demonstrated that having a positive attitude toward the past was negatively related to consumer innovativeness. Before turning attention to the future time perspective, an account of time perspective in broader terms is presented.

Time perspective is conceptualized both as a motivational-cognitive or attitudinal construct and as a stable disposition like personality traits (Kairys & Liniauskaite, 2015; Kooij et al., 2018). Kairys and Liniauskaite (2015, p. 101) posit that, theoretically, time perspective and personality traits “are similar constructs to a certain degree.” A comparison between the constructs reveals several similarities, for example a negative association between future time perspective and openness, the former being associated with low novelty- and sensation-seeking, whereas the opposite characterizes people scoring high on the trait openness. They conclude, however, that the nature of time perspective is two-fold: “The core [...] is relatively stable and similar to [traits] and the shell of it is dynamic and subjective to situational changes” (p. 110). Several scholars have thus advocated for conceptualizing time perspective as a motivational-cognitive construct, more malleable to situational or contextual changes (Kooij et al., 2018; Murphy et al., 2020). The notion that people can be future-oriented with respect to one behavioral domain (e.g., diet) and present-oriented in relation to another domain (e.g., financial spending) underpins the malleability of time perspective.

The many definitions of time perspective that exist share several commonalities. A recent review (Mohammed & Marhefka, 2020, p. 278) integrates these common features and defines time perspective as “a temporal and multidimensional individual difference capturing the degree to which individuals subjectively focus on past, present, and/or future time frames.” Health-promoting behaviors are characterized by long-term benefits but also short-term costs (Hall et al., 2015). Thus, people engaging in health-promoting behaviors are thought to place at least some value on the potential future outcomes related to those behaviors (Sweeney & Culcea, 2017). Several recent reviews have demonstrated a positive association between a future time perspective and beneficial outcomes, including engagement in healthy behaviors (Andre et al., 2018; Baird et al., 2021; Kooij et al., 2018; Murphy & Dockray, 2018). The CFC scale (Strathman et al., 1994) is the second most applied scale to measure future time perspective (Mohammed & Marhefka, 2020). CFC has nomological linkages with other constructs or traits, including conscientiousness, self-control, sensation seeking, and delay of gratification (for a review, see Joireman & King, 2016). Health behavior (including food consumption behavior) is the most heavily studied domain in which CFC is

employed, and the construct plays an important role in understanding various health behaviors (Joireman & King, 2016; Murphy & Dockray, 2018). Since its introduction, several conceptual and operational modifications have been suggested and implemented.

A recent review (Kooij et al., 2018) proposes that the influence of personality traits on behavior is mediated by time perspective. The existing literature demonstrates associations between personality traits and time perspective (Kairys & Liniauskaite, 2015): Briefly, conscientiousness is most consistently and positively associated with a future time perspective; the other traits show less consistent relationships to time perspective, and the valence shifts from positive to negative between studies (Adams & Nettle, 2009; Daugherty & Brase, 2010; Dunkel & Weber, 2010; Kairys & Liniauskaite, 2015; Lafreniere & Cramer, 2006). On the basis of the literature on associations between personality traits and time perspective, paper 2 further proposes that the big five personality traits are positively (negatively) associated with CFC-Future (CFC-Immediate). The mediating role of time perspective has not been widely explored in prior research (Loose et al., 2019). In accord with the FFT and TPB, and in conceptualizing time perspective as an attitudinal concept, it is assumed that personality traits are distal causes that influence consumption behavior through time perspective (characteristic adaptation). Paper 2 therefore proposes that CFC-Immediate and CFC-Future mediate the association between personality traits and consumption of functional foods. The next section elaborates on the evolution of the scale.

Consideration of future consequences (CFC)

The concept of CFC was introduced by Strathman et al. (1994) as the extent to which individuals are likely to consider distant outcomes in choosing their present behavior. It was initially introduced as a unidimensional construct, but more recent examinations of the construct's underlying structure find evidence in favor of a bidimensional factor structure, distinguishing future orientation from present orientation (Joireman et al., 2008; Joireman et al., 2012). One of the rationales for a two-factor structure is the notion that “although individuals may develop a dominant temporal orientation, concern with future and concern with immediate consequences are not polar opposites; that is to say, individuals may consider the future consequences of their actions, the immediate consequences of their actions, or both” (Joireman et al., 2012, p. 1273).

Another line of research concerns domain-specificity, or whether CFC is best conceptualized as a global or domain-specific individual difference construct (Dassen et al., 2015; McKay et al., 2017; van Beek et al., 2013). For example, Murphy et al. (2020) showed that domain-specific CFC scales were more strongly associated with their corresponding behavioral domains compared to the general CFC

scale. They argue that “it is possible that an individual can consider future behavioral outcomes in one domain (e.g., work) and relatively immediate outcomes in another (e.g., health)” (p. 664). The initial conceptualization of CFC as a fixed, domain-free construct has thus been challenged and domain-specificity has been suggested to tackle concerns about small effect sizes and inconsistencies in prior research (Joireman & King, 2016; Murphy et al., 2020; Sweeney & Culcea, 2017).

Food choices involve trade-offs between immediate outcomes such as pleasure and future outcomes related to adverse health effects. van Beek et al. (2013) therefore developed a domain-specific CFC scale to measure future and immediate consideration of current eating behavior and found that healthy eating was only associated (negatively) with consideration of immediate outcomes. Another study (Dassen et al., 2015) investigated associations of a food-specific and a general CFC scale to healthy eating behavior. Only the food-specific scale was related to behavior in the way that consideration of future (vs. immediate) consequences was strongly associated with healthier (vs. unhealthy) eating patterns. Rojas-Rivas et al. (2020) used similar domain-specific CFC-Future and CFC-Immediate scales and found that future-oriented consumers chose whole bread (i.e., healthy option) whereas present-oriented people opted for white bread. More recently, Olsen and Tuu (2021) showed that food-specific CFC well predicted sustainable food consumption. McKay and colleagues have found similar associations (McKay et al., 2018; McKay et al., 2017). Combined, these studies suggest that domain-specific measures of CFC are preferable to global measures in predicting or explaining specific behaviors. One explanation as to why that is can be attributed to Ajzen’s (1988) principle of compatibility: the more compatible the measures are, the more likely they are to share larger communalities with each other.

To the author’s knowledge, a domain-specific approach to CFC to study functional food behavior is still lacking. Paper 2 therefore takes a domain-specific approach to CFC and confirms a bidimensional factor structure (i.e., CFC-Future and CFC-Immediate). Functional food consumption is argued to be a convenient way to adhere to a healthier diet and should thus appeal to consumers both with a desire for immediate gratification (convenience) and a desire for long-term health benefits. It was therefore hypothesized that both CFC-Future and CFC-Immediate are positively related to functional food consumption. Furthermore, time perspective (e.g., CFC) has been proposed to constitute a relevant mediator to the personality–behavior relationship (Kooij et al., 2018), yet the mediating role of time perspective has not been widely explored in prior research (Loose et al., 2019). Paper 2 thus also tested the hypothesis that CFC-Immediate and CFC-Future mediate the association between personality traits and functional food consumption.

1.7.3 Domain-specific personal values

In a similar way to personality traits, values can be conceptualized along a continuum from concrete to abstract. For instance, the basic personal values of Schwartz (1992; e.g., stimulation and power) represent the most abstract conceptualization of values. They are desirable trans-situational goals, varying in importance, that serve as guiding principles in peoples' lives (Schwartz, 1994). Such basic values share an inconsistent relationship with specific behaviors (Cieciuch, 2017; Krystallis et al., 2012; Schwartz, 2017) and are assumed to precede and influence attitudes (Brunso et al., 2004b; Homer & Kahle, 1988). Domain-specific values, on the other hand, reflect desirable goals specific to a particular behavioral domain, for example health or eating, and are acquired through "experiences in specific situations or domains of activity" (Vinson et al., 1977, p. 45). Studies attest that taste or hedonic gratification, convenience, and health are important values underlying the consumption of functional food (Kraus, 2015; Urala & Lähteenmäki, 2003), and the success of functional food has been said to revolve around the proper combination of the three (Gray et al., 2003). For the current research, *hedonic eating value*, *utilitarian eating value*, *convenience orientation*, *health importance*, and *weight management concern* were included.

Utilitarian and hedonic eating values

As noticed above, values can be defined at different levels of abstraction and framed toward different attitudinal objects or behavioral domains such as consumption, eating, or shopping (Hauser et al., 2013; Vinson et al., 1977). Hedonism is a core personal value in Schwartz's (1992) theory of basic values, representing pleasure and sensuous gratification for oneself (Schwartz, 1994). According to the theory, the 10 basic values are structured in a circular pattern to portray how they relate to one another along two bipolar dimensions (openness to change vs. conservation and self-enhancement vs. self-transcendence): "The closer any two values in either direction around the circle, the more similar their underlying motivations; the more distant, the more antagonistic their motivations" (Schwartz, 2012, p. 10). The original values theory (Schwartz, 1992) was later refined to partition the value circle into 19 more narrowly defined values (Schwartz et al., 2012). A second organizing principle relates to what interests value attainment serves: values that primarily regulate how one expresses personal interests and characteristics (e.g., hedonism) vs. values that primarily regulate how one relates socially to others and affects their interests (e.g., tradition; Schwartz, 2016). Health or the desire/motivation to stay healthy is related to the core personal value security (Aertsens et al., 2009; Schwartz et al., 2012).

Eating values are assumed to reflect both utilitarian and hedonic outcomes of behavior (Babin et al., 1994). Consumption thus takes place for hedonic gratification from sensory attributes such as good

taste and for utilitarian reasons related to curbing hunger and staying healthy (Batra & Ahtola, 1991). Although not specifically addressed in Schwartz's value theory, utilitarianism could be argued to reflect an opposing value dimension to hedonism. Utilitarian values or motivations reflect considerations of instrumental or functional attributes and outcomes such as nutritional composition and consequences for health (Dhar & Wertenbroch, 2000; Okada, 2005; Voss et al., 2003). In a food context, utilitarian values are typically represented by considerations of nutrition and other health-related aspects, while hedonic eating values reflect sensory characteristics such as the taste and the pleasure derived from eating a food. Pleasure, or the expectation of experiencing pleasure from food consumption, is an indistinguishable constituent of hedonism or hedonic consumption (Alba & Williams, 2013; Hirschman & Holbrook, 1982): People crave pleasurable sensory attributes from foods (Lusk & Briggeman, 2009), specifically those pertaining to good taste or flavor (Markovina et al., 2015; Verbeke, 2006). Olsen and Tuu (2017), for instance, demonstrate that hedonic eating values increase, whereas utilitarian eating values decrease, the consumption of convenience foods (e.g., hamburgers, pizza, and snacks). Taste has also been identified as a significant factor in functional food acceptance (Urala & Lähteenmäki, 2003, 2007; Verbeke, 2006).

In paper 1, hedonic and utilitarian eating values are proposed to influence attitude formation. Hedonic eating value reflects the importance attached to experiencing pleasure and to the sensory characteristics of food—most importantly the taste or flavor. Utilitarian eating value subsumes considerations about weight management and health-related outcomes of consumption. Both value dimensions have been shown to influence attitudes toward functional foods (Hauser et al., 2013; Tudoran et al., 2009; Žeželj et al., 2012). Paper 1 suggests that utilitarian eating value is positively, while hedonic eating value is negatively, associated with attitude. The rationale for including eating values is to better understand whether consumer evaluation of functional food consumption is differentially influenced by the importance attached to utilitarian vs. hedonic outcomes.

Convenience orientation

Convenience orientation “refers to a person’s general preference for convenient goods and services” (Berry et al., 2002, p. 3). Convenience-oriented consumption satisfies some immediate want or need and releases time and/or energy for alternative uses (Anderson, 1971). Its core constituents are thus the expenditure of time and effort (Farquhar & Rowley, 2009). Olsen et al. (2007) made a distinction between convenience orientation as a feature of the consumer and perceived product convenience as a property of the food. Convenience orientation thus represents the extent to which an individual values convenience (i.e., the importance of saving time and/or effort), while convenience as a property of the

food reflects perceptions about how convenient the food product is (see also Brown, 1989). Candel (2001, p. 17) introduced a definition of convenience orientation particularly relevant to the food domain: “the degree to which a consumer is inclined to save time and energy as regards meal preparation.”

Convenience food products “save time and effort in preparation, consumption, or cleanup” (Brunner et al., 2010, p. 498) and refer to “fully or partially prepared foods in which a significant amount of preparation time, culinary skills, or energy inputs have been transferred from the home kitchen to the food processor and distributor” (Traub & Odland, 1979, p. 3). Convenience and convenience food are, however, ambiguous concepts without fixed boundaries, giving rise to the notion of their being chaotic conceptions (Buckley et al., 2005; Jackson & Viehoff, 2016). Nevertheless, convenience is proposed to constitute an important determinant of food consumption behavior (Berry et al., 2002; Candel, 2001). Convenience food has long been regarded as both unhealthy and unsustainable “in terms of their low nutritional value, wasteful packaging and heavy reliance on imported ingredients” (Jackson & Viehoff, 2016, p. 1). Functional food, however, promotes healthy convenience by merging health attributes with convenience (Dixon et al., 2006; Grunert, 2010), which intuitively would suggest that consumers’ valuation of health and convenience will influence their preference for functional food.

The current research regards functional food as a healthy convenience food and assumes that convenience orientation constitutes a relevant antecedent of consumer evaluation and consumption of functional food. Acknowledging the role that convenience has across different stages of the consumption process, *convenience orientation* here reflects the inclination toward saving time and energy in planning, buying, preparing, and consuming foods (Candel, 2001; Olsen et al., 2007).

Health importance and weight management concern

The link between diet and health is considerable (Katz & Meller, 2014), and health is an important facet of and motivation underlying functional food consumption (Hauser et al., 2013; Pappalardo & Lusk, 2016; Siegrist et al., 2015; Vorage et al., 2020). *Weight management concern* and *health importance* are two health-related values or motivational factors with relevance for (healthy) food consumption behavior. The former reflects the valuation of eating food that does not contribute to weight gain, while health importance represents a more general valuation of health as an important

criterion for making food choices (Steptoe et al., 1995; Tudoran et al., 2009).³ Both health importance and weight management concern are associated with making healthier food choices (Pollard et al., 1998).

As previously mentioned, one inherent property of functional food is the convenient provision of health benefits. Functional food should thus attract attention from people valuing health as an important goal or outcome related to their food consumption behavior. Concern for consuming too many calories from food, for example, influences healthy eating attitudes, such that greater concern leads people to make more conscious efforts to follow a healthy diet (Sun, 2008). Greater concern about calorie intake is further associated with weight management concern and health importance. Brečić et al. (2014) investigated determinants of functional food consumption in a representative sample of Croatians using the FCQ and found that health importance (and convenience orientation), but not weight management concern, influenced consumption. Carrillo et al. (2012), studying determinants of reduced-calorie food consumption, found that weight management concern was a strong, whereas health importance was a less strong, predictor of consumption.

Weight management concern has recently been positively associated with attitudes toward functional food, while health importance was associated with functional food consumption in the same study (Vorage et al., 2020). In the current research, both health importance and weight management concern are presumed to constitute reliable food or eating values in explaining differences in functional food consumption. Here, health importance refers to the extent that individuals value their health in general (Tudoran et al., 2009), whereas weight management concern reflects the degree to which food choices are influenced by concerns about increasing body weight (Olsen & Tuu, 2017; Steptoe et al., 1995).

Paper 3 builds on the assumption that considerations of convenience (convenience orientation), pleasure (hedonic eating value), and health (health importance and weight management concern) constitute salient values underlying food choices: People more concerned about health, convenience, and weight management, and less concerned about the hedonic gratification from eating, are more likely to consume functional food. The four eating values, together with the traits food self-control and food innovativeness, constitute the six segmentation bases on which paper 3 relies.

³ In addition to *health importance* and *weight management concern*, *healthy food importance*—representing the importance of eating healthily—was initially included but omitted following principal component analysis wherein items measuring health importance and healthy food importance all loaded onto a single component (refer to paper 3).

1.8 Research design and data

The data on which the papers rely were collected using an online survey distributed to a representative sample of Norwegian adults in 2019. The survey assessed all of the relevant constructs used to infer and test the theoretical models in this thesis. The first two papers employ a confirmatory, variable-centered approach to empirically test theoretical associations between constructs. The third paper makes use of a more exploratory strategy through a person-centered approach, not to explain or predict relationships between the constructs, but to uncover homogeneous consumer segments that differentially relate to the main dependent constructs attitude, intention, and consumption. Cross-sectional survey research is a common method employed to explore antecedents of food choice behavior, including functional food (Kaur & Singh, 2017; Appendix A). However, most studies fail to achieve adequate sample sizes and samples representative for the population (Bimbo et al., 2017; Topolska et al., 2021).

Paper 1 investigates the antecedents of consumers' attitudes and intentions to eating functional foods applying an extended version of the TPB as the theoretical framework. The extension involves the addition of *descriptive norm* and *self-efficacy* as parallel constructs to *injunctive norm* and *controllability*, respectively, and hedonic and utilitarian eating values as predictors of attitude. The relationships between the constructs are inferred by structural equation modeling (SEM). The paper specifies and tests two structural models—one basic and one extended TPB model—and compares the two models' predictive ability or explanatory power.

Paper 2 proposes a model that considers an integrative and hierarchical structure of personality traits, time perspective, and behavior, and investigates the direct relationships between personality traits and functional food consumption as well as the indirect relationships as mediated through time perspective. The relevance of such an approach has been called for in a recent review (Kooij et al., 2018), encouraging research to test for the mediating effects of time perspective. Paper 2 addresses the question of whether individual differences in personality traits (Donnellan et al., 2006; John & Srivastava, 1999) and CFC (Strathman et al., 1994; van Beek et al., 2013) are interrelated and associated with the consumption of functional foods. The conceptual framework is theory-driven, and the constructs are conceptualized as being hierarchically organized (i.e., traits → time perspective → behavior). SEM is used to investigate the direct relationships between (a) personality traits and CFC, (b) personality traits and behavior, and (c) CFC and behavior, as well as the indirect relationship between personality traits and behavior as mediated through CFC. The dimensionality of the CFC construct is also assessed by specifying and comparing two competing measurement models.

Rather than opting for another variable-centered approach, paper 3 takes a person-centered approach to identify and explore homogeneous subgroups of consumers and how the different subgroups are associated with functional food attitudes, intention, and consumption. The person-centered approach is a valuable alternative and addition to the more traditional variable-centered approach (e.g., SEM; papers 1–2) and aims to determine whether subgroups of people sharing similar combinations of traits and values exist within the population of interest and whether they are differentially associated with outcomes (Howard & Hoffman, 2018). Historically, demographic factors such as age and gender, as well as socio-economic status and education level, have been frequently used as segmentation bases to create demographic profiles of consumers (Hardcastle & Hagger, 2016; van Raaij & Verhallen, 1994). More recent studies use psychographic or psycho-behavioral segmentation bases such as individual differences in traits, values, involvement, and attitudes (Steenkamp & ter Hofstede, 2002; Wedel & Kamakura, 2000), among other factors (for recent reviews in the food domain, see Grunert, 2019; Jenkins et al., 2021). Cluster analysis was used to augment different consumer profiles using food- and health-related traits and values as segmentation bases: Food self-control and food innovativeness (both traits) are combined with health importance, hedonic eating value, convenience orientation, and weight management concern (all values). Analysis of variance with a post hoc test was used to investigate whether and how subgroups of consumers with similar combinations of traits and values are associated with functional food behavior.

1.8.1 Survey design

Surveys, along with experiments, constitute the most frequently used research design for conducting consumer behavior research (Peighambari et al., 2016). Much research to explain or predict consumer evaluation, acceptance, or consumption of functional food has also employed survey designs (e.g., Barauskaite et al., 2018; Büyükkaragöz et al., 2014; Siegrist et al., 2015; Verbeke, 2005). Survey research is, however, associated with multiple sources of error. A key concept in this regard is *total survey error*, or the combination of errors occurring in a survey (Sarıs, 2014); this concept “refers to the accumulation of all errors that may arise in the design, collection, processing, and analysis of survey data” (Biemer, 2010, p. 817). The total survey error framework addresses the many error sources pertaining to measurement (e.g., measurement error, validity) and representation (e.g., sampling error, coverage), and describes means to identify and reduce the influence of potential detrimental errors (Groves et al., 2009). For an introduction to the evolution of total survey error, see Groves and Lyberg (2010).

The current research employed a cross-sectional, self-report survey design, which entails that all variables were assessed at a single time-point and that responses were under the complete control of the respondents. Several methodological issues emanate from such a design, particularly those concerning *method biases* and *causal inferences* (Spector, 2019). Causal inferences refer “to the act of making inferences about the presence or absence of causation” (Sobel, 1996, p. 357). Making causal claims from non-experimental designs (e.g., survey design) should be done with great care and must be based on sound theoretical assumptions or frameworks (Mathieu & Taylor, 2006). The inappropriateness of cross-sectional research to draw causal conclusions resides mainly in the lack of temporal elements in the design (Spector, 2019) and a reliance on observations rather than manipulations (Rindfleisch et al., 2008). The current research relies on well-established and rigorous theory (e.g., TPB and VAB) to move beyond a pure experimental approach.⁴ However, the cross-sectional research design admittedly constitutes the main research limitation of this dissertation and is therefore explicitly addressed in *2.4 Limitations and suggestions for future research*.

Method biases are one of the main sources of measurement error, threatening “the validity of the conclusions about the relationships between measures” (Podsakoff et al., 2003, p. 879). In a narrow sense, “method means apparatus, items, or specific stimulus situation as designed by the researcher for data collection” (Spector & Brannick, 2009, p. 347). More broadly, method is the *process* of measurement, which also includes the respondent, the location and time of measurement, as well as the respondent’s understanding of the purpose of the measurements. Method constitutes a source of bias with two (potential) detrimental effects: (a) biasing the estimates of construct reliability and validity and (b) biasing parameter estimates of the relationships between constructs (MacKenzie & Podsakoff, 2012; Podsakoff et al., 2012). *Common method variance* refers to “variance that is attributable to the measurement method rather than to the constructs the measures represent” (Podsakoff et al., 2003, p. 879) or “systematic variance in measurement attributable to the specific method used to assess a construct” (Spector & Brannick, 2009, p. 347). Cross-sectional designs are quite susceptible to common method variance by its very nature: Measures are self-reported (i.e., common rater effects), and predictor and criterion variables are measured simultaneously (i.e., measurement context effects), as well as item characteristic effects and item context effects (Table 2; Podsakoff et al., 2003). To control or account for biasing method variance, two main approaches have been proposed: Design or procedural remedies and (post-hoc) statistical remedies (MacKenzie & Podsakoff, 2012; Podsakoff et al., 2003; Spector & Brannick, 2009). The former involves careful considerations in the design and execution of the method (e.g., survey), whereas the latter suggests

⁴ However, see Sussman and Gifford (2019) on issues related to causal directionality in the TPB.

various statistical techniques to test for method variance. Procedural considerations made in the current research include efforts to alter scale endpoints (e.g., *strongly agree* vs. *highly likely*), providing an unambiguous definition of the term functional food, ascertaining respondent anonymity, avoiding ambiguous items, and minimizing task difficulty (MacKenzie & Podsakoff, 2012; Podsakoff et al., 2012; Tourangeau et al., 2000). Additionally, the single-common-method-factor approach (Podsakoff et al., 2003) was used to statistically test for common method bias.

Finally, this dissertation collected data from an *online access panel*, which is “a pool of registered people who have agreed to occasionally take part in web-based studies” (Görizt, 2009, p. 473). People’s motivations to participate in online panels are manifold, including interest, enjoyment, and helping out, as well as incentives and need for recognition (Brüggen et al., 2011). The attraction of online access panels (for researchers) emanates from their being a fast data collection process with low costs and sampling efficiency (Callegaro et al., 2014). There are, however, many issues emanating from using online access panels. The main concerns relate to sample integrity and overall data quality (Smith et al., 2016). The current research made use of an online access panel managed by a reputed agency. The choice of data collection strategy resonates with the objective (i.e., objective e) of reaching a large and representative sample of the Norwegian population.

1.8.2 Sample and procedure

The papers are based on survey data collected using computer-assisted web interviewing (CAWI) in 2019. Respondents are Norwegian adults (aged 18–74 years) randomly selected from a pool of pre-recruited members of a reputed research agency’s consumer panel. The sample ($N = 810$) was nationally representative for gender, age, and region. Table 3 summarizes some socio-demographic characteristics of the sample.

Table 3. Socio-demographic characteristics of the sample

Variables and levels	Percentage	Variables and levels	Percentage
<i>Gender</i>		<i>Age</i>	
Men	49.4	Under 30 years	20.0
Women	50.6	30–39 years	21.1
<i>Education</i>		40–49 years	
Primary and lower secondary school	7.7	50–59 years	18.6
Upper secondary school	37.2	Over 60 years	21.2
University (1–3 years)	25.6	<i>Marital status</i>	
University (4 or more years)	26.0	Married or cohabiting	55.6
<i>Occupational status</i>		Not married or cohabiting	
Working	53.4	<i>Region of residence</i>	
Not working	46.6	Northern and mid-Norway	16.7
<i>Children living at home</i>		Southern Norway	
No	71.9	Eastern Norway	43.1
Yes	28.1	Western Norway	26.8

Structural equation modeling: Two-stage approach

In papers 1 and 2, SEM was applied to examine the hypothesized relationships between the constructs. Analyses for paper 1 were done using AMOS (v25.0; Arbuckle, 2014), while RStudio (RStudio Team, 2019) with the *lavaan* package (v0.6–5; Rosseel, 2012) was used for paper 2. The two-stage approach to SEM was used (Anderson & Gerbing, 1988; Hair et al., 2013), which entails specifying and testing (a) the measurement model and (b) the structural model. Confirmatory factor analysis (CFA) was used to assess measurement model fit (i.e., how well the model fits the data) and construct validity, while the structural model specified and tested the hypothesized relationships between the constructs.

SEM is one of the most widely recognized statistical approaches in the social sciences (Tarka, 2018) and the use of SEM in marketing and consumer research is widespread (Babin et al., 2008; Baumgartner & Homburg, 1996), including consumer research on functional food (Carrillo et al., 2013; Rezai et al., 2014). SEM, which designates a family of related statistical techniques (Kline, 2015), “simultaneously reflects a theoretical network of manifest (observed) variables and latent (unobserved) variables (constructs) as well as general statistical technique” (Chin et al., 2008, p. 287). The SEM procedure typically involves five consecutive steps: model specification, model identification, model estimation, model evaluation, and model re-specification (for a discussion of each step, see Chin et al., 2008). When specifying both the relationships between measures and constructs and the structural, directional relationships between constructs, support from sound theoretical assumptions is of utmost importance (Hair et al., 2013).

It is necessary to explicate a couple of terms before proceeding. From their seminal book on multivariate data analysis, Hair et al. (2013) best describe *constructs* as “unobservable or latent factors

represented by multiple variables.” Thus, they cannot be measured directly but instead need to be inferred by one or more variables or indicators, that in combination represent the latent construct. A *measurement model* specifies the indicators for each construct and enables the assessment of construct validity—that is, the extent “to which a set of *measured variables* actually represent the theoretical *latent construct* they are designed to measure” (Hair et al., 2013, p. 543). *SEM* is a multivariate technique to explain relationships among multiple variables or constructs by estimating “a series of separate, but interdependent, multiple regression equations simultaneously” (p. 547).

CFA examines the relationships between the measured items and their corresponding latent constructs to establish construct validity: convergent validity, or the extent to which items measuring a specific construct share a high proportion of variance in common, and discriminant validity, or “the extent to which a construct is truly distinct from other constructs” (Hair et al., 2013, p. 619). Estimating the average variance extracted (AVE) is a common strategy for assessing convergent validity, while the ratio between the AVE and maximum shared variance (MSV) determines discriminant validity. Construct reliability (CR) as a measure of internal consistency is also a much-used indicator of convergent validity. Some rules of thumb are $AVE > 0.5$, $AVE > MSV$, and $CR > 0.7$ (Hair et al., 2013). In addition to assessing construct validity, overall model fit needs to be determined. Several fit indices exist, and for this dissertation four such indices are considered: the root mean square error of approximation (RMSEA), the standardized root mean residual (SRMR), the comparative fit index (CFI), and the Tucker–Lewis index (TLI). Considering the characteristics of the data (i.e., sample size and number of measured variables), satisfactory fit indices are $RMSEA < 0.07$, $CFI > 0.92$, $SRMR < 0.08$, and $TLI > 0.92$ (Hair et al., 2013). However, one-size-fits-all standards for model fit should not prevail (Babin et al., 2008).

Mediation

To test for specific indirect effects of personality traits on behavior through CFC (i.e., mediation, paper 2), the bias-corrected bootstrap procedure with 5,000 resamples was applied (Hayes & Scharkow, 2013; Williams & MacKinnon, 2008).⁵ Mediation refers to “the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest” (Baron & Kenny, 1986, p. 1173). In its simplest form, mediation “represents the addition of a third

⁵ Resampling entails the generation of many pseudo datasets from the original sample to produce confidence intervals, which, because “resampling is done with replacement, each pseudo dataset will tend to be different from all others” (Williams & MacKinnon, 2008, p. 28).

variable to [an] $X \rightarrow Y$ relation, whereby X causes the mediator, M , and M causes Y , so $X \rightarrow M \rightarrow Y$ " (MacKinnon et al., 2007, p. 595). Translated to the current study (paper 2), the mediator(s), M , is time perspective (CFC-Future and CFC-Immediate), X represents the big five personality traits, and Y denotes consumption of functional food. Mediation thus concerns causality: "A mediator is a variable that is in a causal sequence between two variables" (MacKinnon et al., 2007, p. 595). Mediation also applies to the TPB (paper 1), whereby the influence of attitude and social norms on behavior is fully mediated by intention. PBC, on the other hand, exerts both direct and indirect (through intention) influence on behavior. However, contrary to the conceptual model in paper 2, paper 1 does not test for specific indirect effects.

Clustering and analysis of variance

Paper 3 uses cluster analysis as a tool to segment consumers into homogeneous subgroups that share similar characteristics (i.e., traits and values). Segmentation is an essential part of marketing that involves identifying and reducing a heterogeneous market into a number of smaller homogeneous groups of consumers with similar needs and motives (Smith, 1956; Wedel & Kamakura, 2000). Cluster analysis, or clustering, is "the formal study of algorithms and methods for grouping, or classifying, objects" (Jain & Dubes, 1988, p. 1) and is widely used as a classification tool in market segmentation (Punj & Stewart, 1983; Tuma et al., 2011). Clustering algorithms group objects, variables, or items "based on indices of proximity between pairs of objects" (Jain & Dubes, 1988, p. 8). Here, proximity, or similarity, denotes that clusters have "maximum within-cluster similarity and minimum between-cluster similarity" (Alelyani et al., 2014, p. 31), or that objects similar in terms of some chosen features (i.e., segmentation bases) gather together and form a cluster.

Broadly speaking, clustering algorithms can be divided into two groups: hierarchical and partitional (Jain, 2010, but see also Aggarwal & Reddy, 2013).⁶ "Partitional clustering algorithms aim to discover the groupings present in the data by optimizing a specific objective function and iteratively improving the quality of the partitions" (Reddy & Vinzamuri, 2014, p. 88). A widely used partitional clustering algorithm is k-means clustering, which requires an a priori decision on the number of clusters (k) to obtain. Hierarchical clustering algorithms, on the other hand, make no a priori assumptions about the number of clusters, but rather impose a hierarchical structure on the data (Jain, 2010). Hierarchical clustering can follow either a top-down (divisive) or a bottom-up (agglomerative) approach:

⁶ See Saxena et al. (2017), Jain et al. (1999), and Jain and Dubes (1988) for variants of the taxonomies of clustering approaches.

“Agglomerative methods start by taking singleton clusters (that contain only one data object per cluster) at the bottom level and continue merging two clusters at a time to build a bottom-up hierarchy of the clusters. Divisive methods, on the other hand, start with all of the data objects in a huge macro-cluster and split it continuously into two groups generating a top-down hierarchy of clusters” (Reddy & Vinzamuri, 2014, p. 101). K-means and hierarchical clustering algorithms make use of a variety of proximity or similarity measures for deciding optimal cluster solutions. The most popular measure for k-means clustering is Euclidean distance, while single-link, complete link, and Ward’s criterion are methods widely used in combination with hierarchical clustering (Reddy & Vinzamuri, 2014).

For paper 3, a two-stage, hierarchical k-means clustering approach using the R packages *cluster* (Maechler et al., 2019) and *factoextra* (Kassambara & Mundt, 2019) in RStudio (RStudio Team, 2019) was applied. Raw scores were standardized prior to clustering. First, agglomerative hierarchical clustering with Ward’s method (Euclidean distance) was performed. Ward’s method posits that the between-cluster distances should be maximized while the within-cluster distances should, simultaneously, be minimized (Strauss & von Maltitz, 2017). Examination of the agglomeration schedule and visual inspection of the dendrogram was suggestive of a two- or three-cluster solution. Second, the cluster centers identified from step one were used as input to form initial cluster centers for k-means clustering.

To validate cluster solutions, 30 validation indices using the R package *NbClust* (Charrad et al., 2014) were consulted, including the “better-behaving” indices *Silhouette* (Rousseeuw, 1987), *Davies–Bouldin* (Davies & Bouldin, 1979), *Calinski–Harabasz* (Caliński & Harabasz, 1974), *generalized Dunn* (Bezdek & Pal, 1998), *COP* (Gurrutxaga et al., 2010), and *SDBw* (Halkidi & Vazirgiannis, 2001).⁷ One-way analyses of variance (ANOVA) with post hoc tests determined the differences between clusters in terms of the segmentation variables (i.e., values and traits) and the profiling variables (i.e., attitude, intention, and consumption). Chi-square tests of independence investigated differences between clusters for the socio-demographic variables.

1.8.3 Measures and construct validation

The major constructs used in this dissertation were conceptualized as reflective latent variables or factors and are measured with items and scales from prior research. Some scales and items were

⁷ See Arbelaiz et al. (2013) for an extensive comparison of cluster validity indices.

modified to better correspond with the definitions and conceptualizations of the central constructs that make up this dissertation. In a reflective measurement model, a change in the latent construct causes observed changes in the measures or indicators (Jarvis et al., 2003). Take the TPB model, for example: The model's theoretical constructs include intention, attitude, norms, and control, all of which can only be inferred through multiple-indicator measures that reflect variation in the latent factor. Formative constructs, on the other hand, assume a reverse relationship between constructs and its measures (manifest variables): "the manifest variable is deemed to produce or cause the construct" (Chin et al., 2008, p. 288).

The term *functional food* is defined as *foods and beverages enriched with minerals, vitamins, fatty acids, or protein for health-promoting or disease-preventing purposes as part of a standard diet and consumed in normal quantities*. This definition effectively excludes natural foods with similar benefits (i.e., health-promotion or disease-prevention) and emphasizes that it is by enrichment that the food products are rendered functional. It also excludes dietary supplements in the form of tablets, powder, or capsules. Milk and other dairy products enriched with vitamin D are examples of some more common functional food products found in the Norwegian market.

Seven-point Likert-type scales with response categories ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) were used for most measures. Two exceptions apply, the first to the measure of *consumption frequency*, measured on a scale from 1 (*never/seldom*) to 7 (*several times per day*), and the second to the measure of *intention*, using a scale from 1 (*highly unlikely*) to 7 (*highly likely*). The overall structure of the questionnaire was fixed, yet the order of items designed to measure each construct was randomized.

In paper 1, *intention* to consume functional foods was measured with three items adopted from Conner et al. (2002) and Fishbein and Ajzen (2010/2015). *Attitude* was measured using three items that reflected a hedonic, a utilitarian, and a global dimension (Crites et al., 1994; Voss et al., 2003). *Social norms* were measured by six items, three items reflecting *injunctive norm* and three items reflecting *descriptive norm* (Dunn et al., 2011; Rhodes et al., 2006). *PBC* was measured with six items, three items reflecting *controllability* and three items reflecting *self-efficacy* (Armitage & Conner, 1999; Dunn et al., 2011; Hagger & Chatzisarantis, 2005; Rhodes & Courneya, 2003b). Hedonic and utilitarian eating values were measured according to Olsen and Tuu (2017) and inspired by Voss et al. (2003) and Babin et al. (1994).

In paper 2, the big five personality traits were measured using the Mini-International Personality Item Pool (Mini-IPIP; Donnellan et al., 2006). CFC was measured with eight items adapted from van Beek et al. (2013), of which four items were designed to reflect consideration of future consequences (CFC-

Future) and four items consideration of immediate consequences (*CFC-Immediate*). The original items were adapted by adding a stronger emphasis on food choice (vs. eating behavior) and health outcomes (vs. outcomes) to mitigate the interpretational ambiguity associated with the original scale (Tórtora & Ares, 2018).

Paper 3 applied cluster analysis to determine the existence of subgroups sharing similar combinations of food-related traits and values. *Food innovativeness* (trait) was measured with seven items as a combination of consumer innovativeness (Goldsmith & Hofacker, 1991), variety-seeking tendency (van Trijp & Steenkamp, 1992), and need for stimulation (Steenkamp & Baumgartner, 1995). *Food self-control* (trait) was assessed with five items adapted from Honkanen et al. (2012) and Tangney et al. (2004). *Hedonic eating value* was measured with five items from Olsen and Tuu (2017); *convenience orientation* with five items based on Steptoe et al. (1995), Olsen et al. (2007), and Voss et al. (2003); and *health importance* with three items adapted from Tudoran et al. (2009). To measure *healthy food importance* (see Footnote 3), three items from Tudoran et al. (2009) and Olsen (2003) were used, while two items from Olsen and Tuu (2017) were used to assess *weight management concern*. The measures used to profile the segments include four items reflecting *attitude* (Crites et al., 1994; Fishbein & Ajzen, 2010/2015), five items reflecting *intention* (Fishbein & Ajzen, 2010/2015; Honkanen et al., 2005), as well as measures of general and functional food consumption frequencies.

The measurement model in paper 1 yielded acceptable model fit after omitting three problematic items, $\chi^2(175) = 559.58$; RMSEA = 0.05; CFI = 0.97; SRMR = 0.05; TLI = 0.96. Factor loadings were significant and ranged from 0.65 to 0.96. Convergent validity (AVE > 0.5; CR > 0.7) of constructs was achieved. Some correlations between constructs were high (i.e., $r > 0.7$); however, the square root of AVE was greater than the inter-construct correlations and AVE > MSV, indicating acceptable discriminant validity.

In paper 2, the measurement model fit improved after deleting five items (one item per personality trait) due to low factor loadings or high error correlations, $\chi^2(209) = 842.26$, RMSEA = 0.06, CFI = 0.90, SRMR = 0.06, TLI = 0.88. While modification indices proposed further means to improve fit, it was deemed inappropriate to correlate error terms between items measuring different constructs (Hermida, 2015; Landis et al., 2008). Omitting additional items to achieve a better fitting measurement model was also considered unseemly. Model fit issues pertaining to personality inventories such as the Mini-IPIP are not unprecedented (Hopwood & Donnellan, 2010; Perry et al., 2020). Correlation coefficients between constructs were all below 0.7. Factor loadings were all significant, ranging from 0.41 to 0.83. Some issues pertaining to construct validity are however evident.

Paper 3 examined the underlying structure of the measures with principal component analysis (PCA; Varimax rotation). The main reason for the more exploratory approach rests on the extent that the original measures were adapted and a recognition that it is common practice in person-centered or segmentation research. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were used to determine item factorability. The initial seven-component solution contained several cross-loadings and items with low communalities. Following some modifications, the final PCA revealed six principal components: *food innovativeness*, *food self-control*, *hedonic eating value*, *convenience orientation*, *health importance*, and *weight management concern*. The six components explained 78% of the total variance and factor loadings ranged from 0.72 to 0.88. Internal reliability scores were satisfactory, $\alpha > 0.70$.

The structural models tested in papers 1 and 2 demonstrated acceptable fit indices. In paper 1, two structural models (basic vs. extended TPB) were specified (RMSEA = 0.05–0.07; CFI = 0.95–0.99; SRMR = 0.03–0.12; TLI = 0.94–0.98). Fit indices except SRMR for the extended model were acceptable. Paper 2 specified and tested four structural models. Two models tested the direct relationships between CFC and consumption (model 1) and between personality traits and consumption (model 2), respectively. The fit indices of model 1 were acceptable, $\chi^2(46) = 160.80$, RMSEA = 0.06, CFI = 0.96, SRMR = 0.04, TLI = 0.94. The fit of model 2 was not acceptable, $\chi^2(121) = 574.06$, RMSEA = 0.07, CFI = 0.88, SRMR = 0.05, TLI = 0.83. The next two models tested mediation. Model 3a tested a full mediation model, constraining the direct paths between personality traits and consumption to equal zero. Model fit was unsatisfactory, $\chi^2(279) = 976.84$, RMSEA = 0.06, CFI = 0.89, SRMR = 0.05, TLI = 0.87. Allowing the direct paths between personality traits and consumption to be estimated freely, model 3b also demonstrated suboptimal fit, $\chi^2(274) = 965.99$, RMSEA = 0.06, CFI = 0.90, SRMR = 0.05, TLI = 0.87. A chi-square difference test was used to compare the two nested models, implying marginally improved model fit, $\Delta\chi^2_{(5)} = 10.85$, $p = .05$. Table 4 presents summary information about the main constructs included in this thesis.

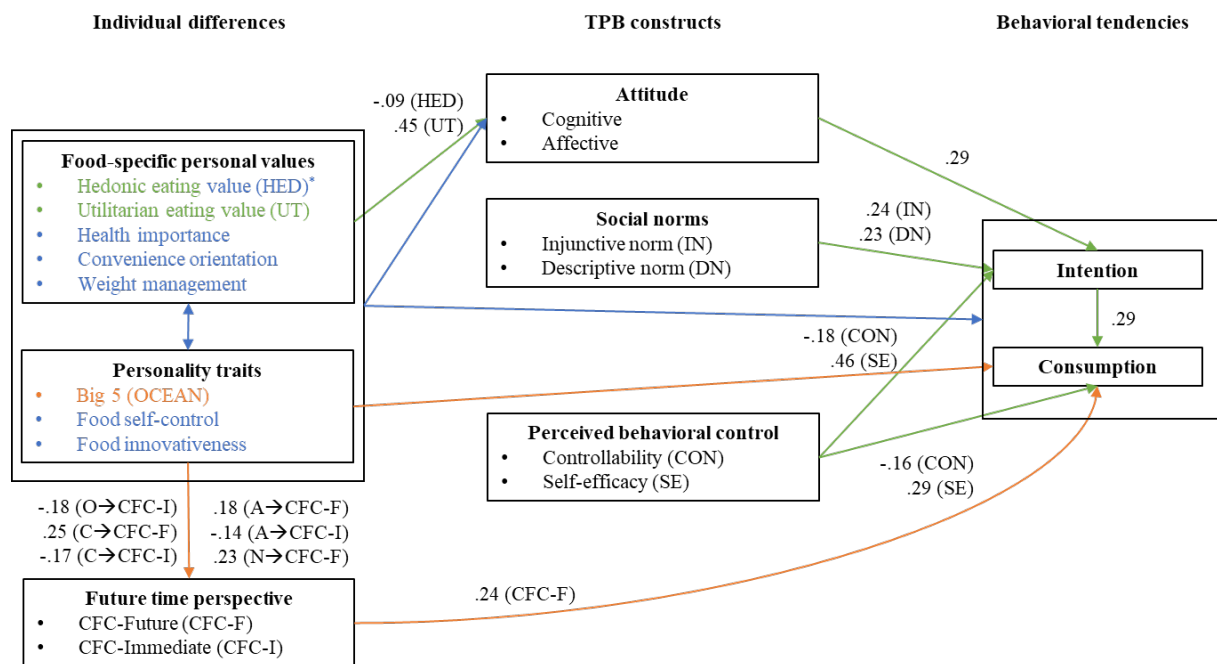
Table 4. Summary of focal constructs

Constructs	Paper	Items	Mean (SD)	Internal consistency		AVE (CFA)	Method
				<i>CR</i>	<i>α</i>		
Intention	1, 3	3/5	4.05 (1.56)	0.95	0.97	0.88	CFA/PCA
Attitude	1, 3	3/4	4.72 (1.31)	0.87	0.94	0.69	CFA/PCA
Hedonic eating value	1, 3	3	5.45 (1.12)	0.89	0.89	0.73	CFA/PCA
Utilitarian eating value	1	3	5.11 (1.16)	0.83	—	0.63	CFA
Injunctive norm	1	3	3.78 (1.51)	0.95	—	0.87	CFA
Descriptive norm	1	2	3.80 (1.44)	0.93	—	0.86	CFA
Controllability	1	2	4.89 (1.23)	0.72	—	0.56	CFA
Self-efficacy	1	2	4.55 (1.30)	0.78	—	0.64	CFA
CFC-Future	2	4	4.89 (1.02)	0.83	—	0.55	CFA
CFC-Immediate	2	4	3.54 (1.19)	0.83	—	0.55	CFA
Openness	2	3	4.60 (1.13)	0.73	—	0.49	CFA
Conscientiousness	2	3	4.88 (1.14)	0.67	—	0.42	CFA
Extraversion	2	3	4.03 (1.23)	0.75	—	0.50	CFA
Agreeableness	2	3	5.18 (1.11)	0.74	—	0.49	CFA
Neuroticism	2	3	3.69 (1.20)	0.68	—	0.43	CFA
Food innovativeness	3	4	4.67 (1.28)	—	0.90	—	PCA
Food self-control	3	4	3.86 (1.41)	—	0.89	—	PCA
Convenience orientation	3	4	4.96 (1.09)	—	0.84	—	PCA
Health importance	3	3	5.51 (1.15)	—	0.87	—	PCA
Weight management concern	3	2	4.98 (1.31)	—	0.86	—	PCA

PART 2. MAIN FINDINGS, DISCUSSION, AND CONTRIBUTIONS

The objectives of this dissertation were to further the understanding of the antecedents of consumer evaluation and consumption of functional food in a Norwegian context and to identify central consumer characteristics that facilitate or impede the consumption of foods enriched with functional ingredients. This was pursued through a combination of variable- (SEM) and person-centered (cluster analysis) approaches. The first study (paper 1) specified and tested an extended version of the TPB with separate constructs for self-efficacy and descriptive norms and with background factors (hedonic eating value and utilitarian eating value) hypothesized to be associated with attitude formation. The second study (paper 2) investigated the interrelationships between the big five personality traits and (future) time perspective and tested their role in explaining functional food consumption. In the third study (paper 3), a person-centered approach was taken to identify consumer profiles based on individual food-related values and traits and to decide whether and how they are differentially related to consumer evaluation and consumption of functional food. Summary results are presented in Figure 2, which depicts the conceptual model with the main relationships (beta coefficients) identified in papers 1 and 2. Corresponding to objective d (p. 13), the combined results of this research provide new insights into Norwegian consumers' evaluation and consumption of functional food. It demonstrates how important social cognitive antecedents—as well as individual differences in personality traits, personal values, and temporal frame—influence behavioral tendencies toward functional food. It further identifies consumer profiles with dissimilar combinations of food-related traits and values and demonstrates and explain how they differ in their attitudes, intentions, and consumption of functional food.

Figure 2. Conceptual model with significant beta coefficients displayed



Paper 1: SEM (extended TPB)
 Paper 2: SEM (big 5 → CFC → consumption)
 Paper 3: Cluster analysis (consumer profiles)

* Hedonic eating value included in both paper 1 and paper 3
 → Denotes directional relationships
 ↔ Denotes nondirectional relationships

This dissertation provides new insights into understanding consumers' underlying motivations and dispositions regarding the consumption of functional foods in Norway. The findings disclosed in this dissertation have important implications for future research on consumer behavior and functional food, as well as for food manufacturers and marketers of functional food with respect to product development, positioning, and communication. Subsections 2.1–2.3 present and discuss the main findings from the three papers.

2.1 Extending the TPB to better explain intention and consumption behavior

Paper 1 assessed the ability of an extended TPB to explain consumers' inclination toward the consumption of functional foods and established superior explanatory ability compared to its basic counterpart, corresponding to objective a: To test and establish whether an extended version of the TPB, that incorporates separate constructs of self-efficacy and descriptive norm—as well as hedonic and utilitarian eating values—as antecedents of attitude formation, provides superior explanatory ability over the basic TPB. The results demonstrated that the extended model increased explained

variance from 64.8% to 70.5% ($f^2 = 0.19$; medium- to large-effect size). Both self-efficacy and descriptive norms were shown to influence the formation of intention, the former being the strongest predictor. This result implies that motivation to consume functional food is largely associated with the confidence in one's ability to consume such foods. Moreover, self-efficacy and intention were equally important in explaining consumption frequency, once again demonstrating that the inclusion of self-efficacy in the TPB contributes to a deeper understanding of behavioral antecedents.

Worth noting, however, is the possible confounding effect of self-efficacy—known as the self-efficacy-as-motivation argument. The debate on whether measures of self-efficacy in fact assess motivation (intention) rather than capability (self-efficacy) was instigated by Williams and Rhodes (2016). Other authors have acknowledged the argument, but as Schwarzer and McAuley (2016, p. 133) convey: “Confounding is the rule, not the exception.” Beauchamp (2016) further contends that it is the operationalization, not the construct itself, that has been confounded. Thus, great care should be taken in designing the measures to mitigate confounding. The measurement model in paper 1 established discriminant validity between intention and self-efficacy, implying that measures of the two constructs were in fact different. The observed relationship between self-efficacy and intention came as no surprise and it resonates well with the contention that motivation to engage in a behavior is strongly associated with people's perceived capacity to do so (de Vries, 2016). The empirical finding that self-efficacy was more strongly associated with intention compared to controllability is also in accordance with other research (Armitage & Conner, 2001; Povey et al., 2000a).

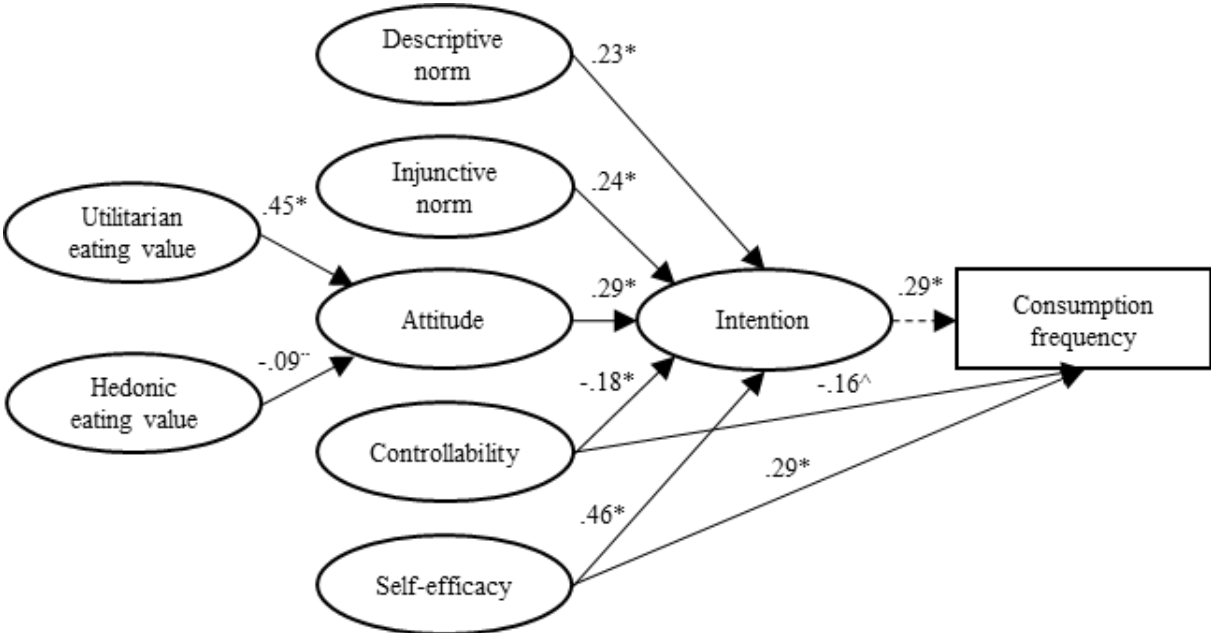
Another important finding is the nature of the relationships between hedonic and utilitarian eating values and attitude. Relative to hedonic eating value, utilitarian eating value was markedly the most significant contributor to attitude. The strong association between utilitarianism and attitude supports the notion that functional food first and foremost appeals to consumers who value health and nutrition as important criteria for food choices. Thus, the main target for functional food (persistently) seems to be the health-aware or health-oriented consumer. This implies that functional food marketers will benefit from continuing to promote functional food products with health claims or as the healthier option, while simultaneously keeping in mind that other attributes, particularly those of taste and convenience, are not to be ignored: Recall that the success of functional food rests on the proper combination of health, taste, and convenience.

Furthermore, the role of social norms in explaining behavioral tendencies toward functional food should not be neglected. The results confirm a multicomponent structure for social norms, namely injunctive and descriptive norms. Both types of norms contributed equally to explaining intentions to consume functional foods. Thus, it is not only the perceived or explicit expectations of significant

others that affect one’s intentions (i.e., “I expect you to eat more functional food”), but also norms that are based on observing other people’s actions (i.e., “watching people like me suggests that I ought to consume more functional food”).

One theoretical implication of these results is the importance of additional constructs in research applying the TPB. The food industry could potentially benefit from improving the hedonic attributes of functional foods to attract new consumer segments, balancing its “functional” focus with consumers’ hedonic expectations. Figure 3 shows the associations between the theoretical constructs with beta-values depicted.

Figure 3. SEM of relationships between eating values and TPB constructs (paper 1)



Note. * p < .001; ^ p < .010; " p < .050. Beta coefficients (Std β). The dashed arrow suggests a cautionary take on the interpretation of the causal relationship from intention (future) to consumption frequency (past).

2.2 The roles of personality traits and time perspectives

Paper 2 investigated the hierarchical relationship between personality traits, time perspectives, and behavior, also answering a call for research to investigate the mediating role of time perspectives (Joireman & King, 2016; Kooij et al., 2018), corresponding to objective b: To investigate and establish the interrelationships between the big five personality traits and future time perspective and test their roles in explaining functional food consumption. The results suggest that conscientious people are

more considerate of future health outcomes and less concerned with the immediate consequences or rewards pertaining to their food choices. Similarly, agreeable people tend to consider the future—and to a lesser degree, the immediate—consequences of their food choices. Neuroticism is only associated with consideration of future consequences in a direction meaning that the more neurotic people are, the more considerate of future consequences. In contrast, openness is only related to CFC-Immediate such that the more open people are, the less considerate they are of immediate consequences.

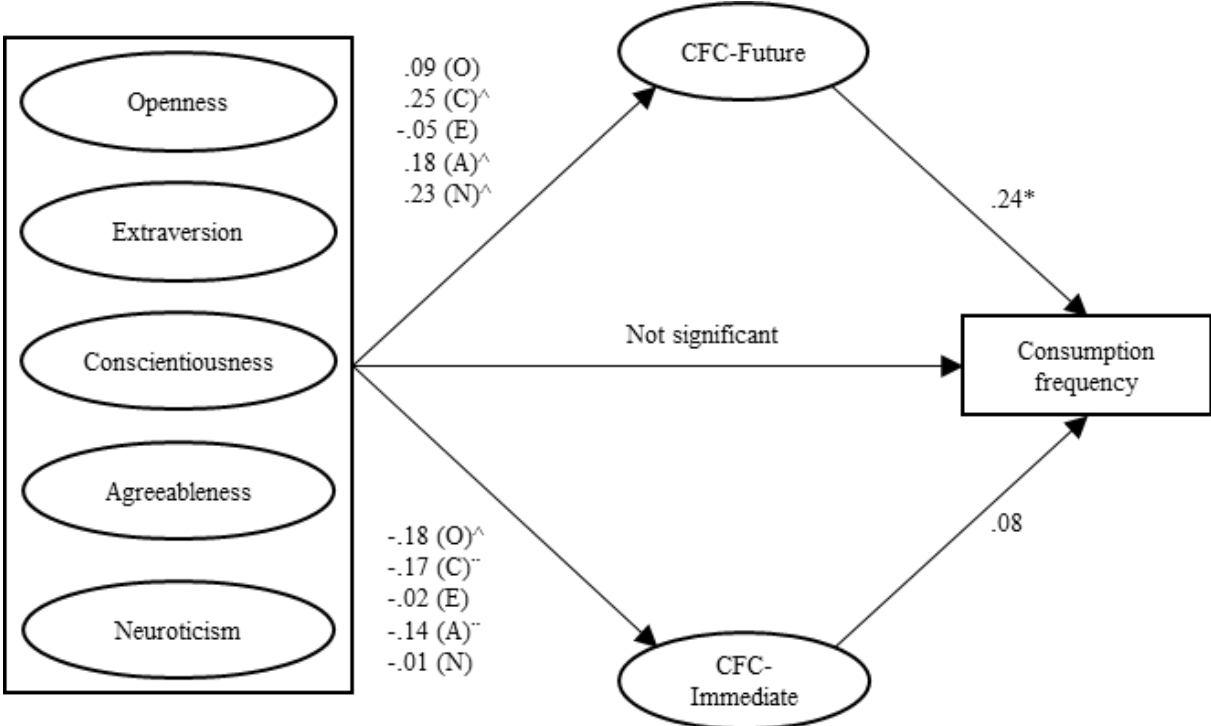
The results further suggest that time perspective does mediate the trait–behavior relationship. Specifically, CFC-Future positively mediates the association between consumption of functional food and traits conscientiousness, agreeableness, and neuroticism. Drawing on this finding, and with the Baron and Kenny (1986) definition of mediation in mind, the generative mechanism through which conscientiousness, agreeableness, and neuroticism influence functional food consumption is thus the extent to which individuals consider future outcomes when choosing foods.

Paper 2 also confirms a significant and negative relationship between CFC-Future and CFC-Immediate (Joireman et al., 2008; Joireman et al., 2012; van Beek et al., 2013). The domain-specific conceptualization of CFC-Future translates into consideration of future health consequences of present food choices, implying a conflict or tradeoff between instant sensorial hedonism (e.g., eating pleasure) on the one hand and potential detrimental health outcomes in the future on the other. Being conscientious entails a predisposition to think before acting and to delay gratification (John et al., 2008). The evident relationship between conscientiousness and CFC-Future thus comes as no surprise: Conscientious people are more likely to consider and to be influenced by the potential detrimental future health effects related to their current food choices. The patterns of relationships between certain personality traits and time perspectives are congruent with some previous investigations into their relationships (Gick, 2014; Kooij et al., 2018; Thelken & de Jong, 2017). An important contribution of paper 2 resides in the differential association between personality traits and future vs. present time perspective (i.e., positive vs. negative valence), thus offering a broader understanding of the associations as compared to a one-dimensional conceptualization of CFC.

Paper 2 failed to confirm a direct relationship between personality traits and consumption of functional foods. A plausible explanation is that consumption of functional food is too specific a behavior to be influenced by such broad predispositions as the big five traits—that is, there is a lack of compatibility between the constructs (Ajzen & Fishbein, 2005). A remedy to handle incompatibility could either be to broaden the behavior in question or to narrow the traits, for example using traits domain-specific to (healthy) eating. This result does, however, make an important contribution: Broad personality traits influence specific (health-related) behaviors only indirectly as mediated through

(domain-specific) future time perspective. Figure 4 displays the associations between the theoretical constructs underlying paper 2 (beta-values showing).

Figure 4. SEM of relationships between personality traits, time perspective, and consumption frequency (paper 2)



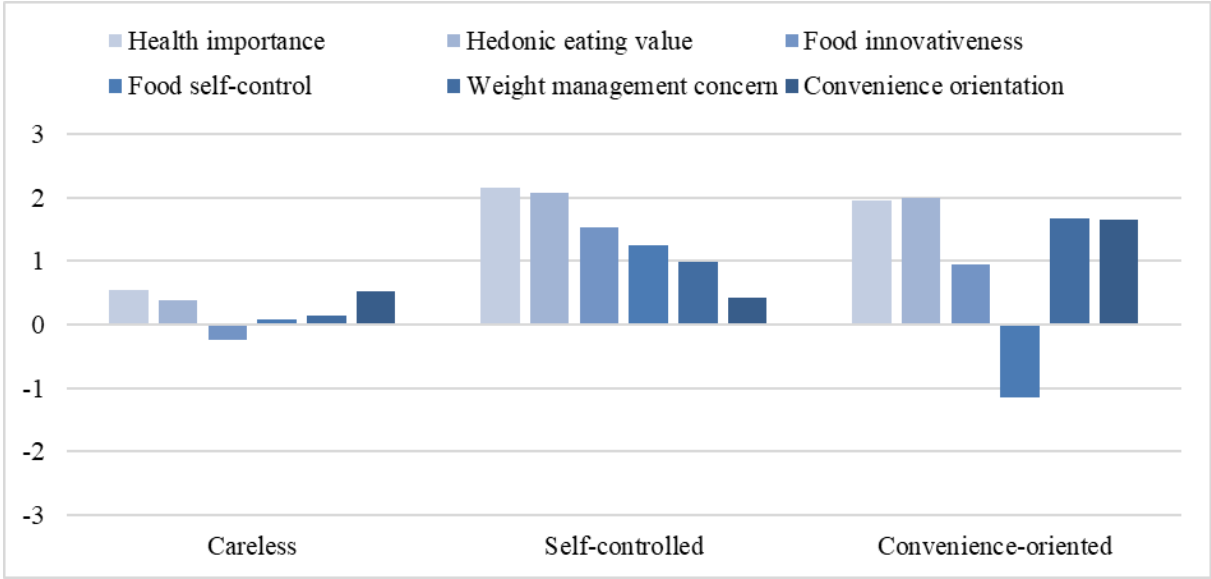
Note. * $p < .001$, [^] $p < .010$, and [^] $p < .050$. Beta coefficients (Std β). Significant indirect effects: Conscientiousness–CFC-Future ($\beta = .06$), Agreeableness–CFC-Future ($\beta = .04$), and Neuroticism–CFC-Future ($\beta = .06$).

2.3 Profiling consumers based on traits and values

Paper 3 aimed to explore and explain differences in behavioral and motivational tendencies toward functional food between consumer segments, corresponding to objective c: To investigate and discuss whether consumer profiles based on individual, food-related values and traits are differentially related to consumer evaluation and consumption of functional food. Hierarchical k-means clustering revealed three homogeneous subgroups of consumers, and subsequent analysis of variance confirmed differences between consumer segments in their propensity to consume functional food. The two most important value dimensions across segments were health and hedonic eating value.

The combination of being convenience oriented, concerned about weight gain, and having a low level of self-control was characteristic of consumers belonging to the *convenience-oriented* segment. Convenience-oriented consumers comprised the largest segment, representing 41% of the sample, and were the most inclined to evaluate functional food consumption positively. Consumers in the segment referred to as *self-controlled* were characterized by a combination of high levels of food self-control and food innovativeness. This group of consumers was the smallest, representing 24% of the sample. The third segment was labeled the *careless* and consisted of consumers with the lowest scores across all segmentation bases. The identification of such a segment, characterized by limited interest in food and nutrition (Jenkins et al., 2021), is not uncommon (Brečić et al., 2017; Sparke & Menrad, 2009; Szakály et al., 2012). These careless consumers represented 35% of the total sample. Careless and self-controlled consumers showed similar attitudes and behavioral tendencies toward functional food. Figure 5 depicts differences in overall means for the six segmentation bases between segments.

Figure 5. Differences in overall means for the six segmentation bases between segments



Note. Original scale (1–7) rearranged to better visualize differences between segments (3 = 7 while -3 = 1).

Regarding socio-demographic characteristics, the convenience-oriented consumer was typically a woman (59.0%) with higher education (54.2%). The self-controlled consumer was more often women (54.1%), older (53.6% are aged 50–74), and with higher-level education (62.9%), whereas most careless consumers had a lower education level (51.2%). The fact that consumers more inclined to favor functional food consumption were women agrees with previous studies, suggesting that women are the main target of functional food (Siró et al., 2008).

The results provide new insights into the underlying motives and goals of consumers more vs. less susceptible to consuming functional food. Employing a person-centered approach enabled a deeper and comprehensive understanding of how different combinations of food-specific values and personality traits contribute to explaining variations in consumer evaluations and behavioral tendencies toward functional food. Convenience orientation appears to have an important role in explaining differences in functional food consumption, which is not necessarily a very controversial finding. However, convenience-oriented consumers more often engaged in snacking behavior (i.e., consumption of snack foods and sweets). One possible explanation may be attributed to their lower self-control, which may indicate that although they appreciate good health, they fall more easily for the temptation that snack foods represent. Other research has demonstrated that self-control is positively associated with eating healthy snacks (Galla & Duckworth, 2015) and negatively with unhealthy snacking habits (Adriaanse et al., 2014). Another potential explanation may lie in their elevated concerns about gaining weight: If their stronger weight management concern reflects an underlying motivation to achieve or maintain a desired appearance rather than a general health motive, engaging in snacking behavior does not necessarily go against their consumption goal. Previous studies have shown that weight-concerned people (particularly women) generally find it difficult to control their food intake (van der Laan et al., 2014) and that self-control is predictive of weight loss success (Will Crescioni et al., 2011). The combined effect of low self-control and attention to weight management may therefore provide yet another explanation as to why the convenience-oriented consumer appears to have difficulty in abandoning unhealthy food. Of particular interest is the relative size of the segment. The convenience-oriented consumer segment (41% of the sample) may potentially represent not only a niche market but a market of significant size for functional food producers to target.

The group of consumers high in self-control appears to have the healthiest eating pattern: higher frequencies of fruit, vegetables, and berries and lower frequencies of sweets, snack foods, pasta, and ready-made foods. Level of self-control best distinguishes the self-controlled consumer from the convenience-oriented consumer, thus suggesting level of self-control as a potential explanation for variations in eating pattern. The self-controlled consumer also exhibited high levels of food innovativeness, which previously has been associated with behavioral tendencies toward functional food consumption (Huotilainen et al., 2006). One potential explanation as to why self-controlled consumers in the present study were more reluctant to consume functional food may rest on their weaker convenience orientation. The largest discrepancy in the segmentation bases between the self-controlled and the careless consumer was level of food innovativeness. The careless consumer was characterized by a reluctance or incuriosity toward new food experiences and was uninvolved or uninterested in both food and health. Several other investigations have found segments with similar

features: Their hallmark is low scores on all variables and a pronounced reluctance toward novelty (Brečić et al., 2017; Buckley et al., 2005; Szakály et al., 2012). The careless consumer had significantly lower consumption rates of vegetables and higher rates of energy and vitamin drinks compared to the convenience-oriented and self-controlled consumers.

Overall, the roles of food innovativeness and self-control add nuance to the existing literature in the domain of functional food behavior, representing two traits with discriminant ability for understanding consumers' food choices. For the current research, (lack of) self-control particularly proved important in identifying and describing consumers most inclined toward the consumption of functional food. The person-centered approach is argued to facilitate a better understanding of *who* the functional food consumer is and how they differ from other segments in terms of consumption habits, attitudes, and behavioral intentions toward eating functional foods. Having identified features of *the functional food consumer*, producers and marketers of functional foods can tailor their products and marketing strategies to match consumers' expectations.

2.4 Limitations and suggestions for future research

First, some general limitations are addressed. The cross-sectional research design employed herein constitutes the main research limitation. Cross-sectional research is inherently correlational, making causal inferences inappropriate. The gold standard for making causal inferences (or causal claims) is the randomized field experiment (Antonakis et al., 2010): "An experiment is a study in which at least one variable is manipulated and units [e.g., individuals] are randomly assigned to the different levels or categories of the manipulated variable(s)" (Pedhazur & Schmelkin, 1991, p. 251). The primary strength of the experimental design lies in the confidence it provides in that any change in the dependent variable is due to the manipulation of the independent variable or chance (Haslam & McGarty, 2014). To infer a causal relationship between two variables, (at least) three requirements need to be fulfilled: (a) the cause needs to precede the effect in time (temporal precedence); (b) the cause and the effect need to covary (covariation); and (c) other plausible causes need to be ruled out (no alternative explanations; Pirlott & MacKinnon, 2016; Shadish et al., 2002). For non-experimental research, van der Stede (2014, p. 573) argues that "to be able to prudently suggest the existence of a causal relationship", a compelling theoretical causal model needs to be established. The model further needs to confirm a correlation between the focal variables and maintain that the cause logically precedes the effect after controlling for confounding variables. Paper 1 rests on the assumption of causality that underlies the TPB and does not prove, but rather infers, causal relationships. The concurrent and retrospective assessment of consumption behavior further undermines causal

explanations: The behavioral measure is assessed concurrent with the TPB constructs, providing a measure of past behavior rather than future behavior. Past behavior can in fact influence intentions and future behavior (Albarracín & Wyer Jr, 2000; Rhodes & Courneya, 2003a). Also, relationships between TPB constructs and behavior have been found to be stronger when using concurrent designs as opposed to prospective designs, that is, assessing behavior later (e.g., self-report or objective measures; Manning, 2009; McEachan et al., 2011). Future research that incorporates experimental designs and/or prospective measures of behavior is therefore encouraged and plans to conduct consumer experiments have already been initiated.

Notwithstanding the TPB's utility and popularity, several scholars have raised concerns about the theory (for a critique and overview, see Sniehotta et al., 2014). An editorial in *Health Psychology Review* (Sniehotta et al., 2014), entitled *Time to Retire the Theory of Planned Behaviour*, triggered a host of commentaries from the likes of Ajzen (2015), Armitage (2015), and Conner (2015; for an editorial summary of these commentaries, see Hagger, 2015). The general consensus is that the TPB "will continue to serve as a basis or root of a multitude of new theories, revision and extensions" (Hagger, 2015, p. 127), and the current research is thus a testament to the theory's longstanding legacy.

Another general limitation resides in the self-reported nature of the survey data. Self-reported data are prone to a host of method biases that can potentially threaten the validity of a study's results (Podsakoff et al., 2012; Subar et al., 2015). For example, Podsakoff et al. (2012, p. 565) conclude in their review that "the [empirical] evidence shows that method biases can significantly influence item validities and reliabilities as well as the covariation between latent constructs." In the two confirmatory studies (paper 1 and paper 2), the common method factor technique is used as a statistical remedy, controlling for the effects of an unmeasured latent methods factor (Podsakoff et al., 2003). In both studies, common method bias did not pose a concern. Common method bias in research applying the TPB has been found not to pose a severe threat to validity (Schaller et al., 2015).

The papers in this dissertation rely on a superordinate conceptualization of functional food rather than specific products, which is a strength considering generalizability but certainly a limitation for predictive ability. Consumer evaluations of functional food is not unconditional but varies according to the perceived fit of specific combinations of food product and the incorporated functional ingredient(s) (de Jong et al., 2003; Krutulyte et al., 2011; Lu, 2015). As such, people can simultaneously favor functional food as a category *and* disapprove of a specific exemplar of a functional food. Thus, future research targeting specific functional food products is encouraged to mitigate issues pertaining to predictive ability. Moreover, consumption frequencies were assessed with

single-item measures and in retrospect. Although single-item measures are commonly applied to assess self-reported food consumption frequencies (Goetzke et al., 2014; Olsen et al., 2007), multiple-item measures enable for estimation of reliability (Bergkvist & Rossiter, 2007) and should thus guide future research.

Cultural variability in food consumption behavior is a known phenomenon (Gracia & Albisu, 2001; Prescott et al., 2002; Sparke & Menrad, 2009). Generalization of the current findings can thus be challenging as the survey population is made up of Norwegian citizens. As such, further research should appropriately address cultural differences by also including samples from other regions of the world.

The conceptual model in paper 1 disregards behavioral, normative, and control beliefs. Including measures of beliefs could have provided a deeper understanding of the underlying determinants shaping consumers' attitudes, social norms, and PBC toward functional food consumption (Patch et al., 2005). Hence, future research should consider including beliefs as antecedents to the TPB's main constructs. Additionally, the theoretical assumptions about the moderating influence of PBC on the attitude–intention and subjective norm–intention relationships (Ajzen, 1985, 2002a) have recently been empirically supported (La Barbera & Ajzen, 2020, 2021). The two studies yielded results demonstrating that “the predictive power of attitude tends to increase with perceived behavioral control, whereas subjective norm tends to predict intention better when perceived behavioral control is low rather than high” (La Barbera & Ajzen, 2021, p. 42). The author endorses their subsequent recommendation to include interaction terms in future research guided by the TPB.

In paper 2, modifications to the original Mini-IPIP scale constitute a limitation with respect to generalizability or the comparability with similar research using the original scale. To mitigate the threat, the structural models without scale modifications were also tested and yielded similar parameter estimates (however, the model fit was severely worse). Likewise, modifications to the CFC scale have been disadvised until measurement issues concerning the global CFC construct have been resolved (Joireman & King, 2016). In retrospect, the global CFC scale should have been included as a parallel measure. Relatedly, competing conceptualizations of and scales to assess time perspectives could have been used (e.g., ZTPI, Temporal Focus Scale). Also, the specification of time frames (e.g., 3 vs. 10 years into the future) has been proposed as a means to improve the precision of time perspective measurements (Mohammed & Marhefka, 2020) and should be considered in future research efforts. Time perspective is further only one of many plausible mechanisms potentially relevant to the personality–(health) behavior relationship. Future research would therefore benefit

from applying a more comprehensive personality inventory and include other relevant mediators such as health habits, eating values, or attitudes toward functional food.

Considering the importance of identifying appropriate segmentation bases, the inclusion of other variables can prove useful. Future research would benefit from considering food safety importance, food naturalness importance, health claims credibility, knowledge about functional foods, and social norms due to their association with consumer acceptance of a product (Siró et al., 2008). In contrast to domain-specific bases, broader personality traits (John & Srivastava, 1999; McCrae & Costa, 1997) and universal values (Bilsky & Schwartz, 1994; Rokeach, 1973) could also constitute segmentation bases to gain insight into their interrelationships and ability to identify and differentiate between different groups of functional food consumers.

An example of a future study

The current research is based on a comprehensive survey. It is thus reasonable to suggest that future research on the topic ought to include experimental designs to overcome the main drawbacks of cross-sectional research. Because taste perceptions or expectations are perhaps the most important antecedents for food choices (e.g., Cunha et al., 2018), and the fact that functional food is new to many Norwegians, combining sensory evaluation (Lawless & Heymann, 2010; Symmank, 2019) with measures of attitude, values and personality should provide additional insights and inform decision makers with useful data in an industrial context (product development). Moreover, in the context of communication, the industry faces several challenges. For example, how can the benefits of functional food be communicated in a competitive food market? Based on the theoretical framework, constructs, and findings of this thesis, I would like to propose an analysis that combines a new approach (construal level theory) with practical implications for industrial actors.

In a construal level framework (Liberman et al., 2007; Trope & Liberman, 2003), objects, events, or situations can be represented in human minds on different mental levels depending on their psychological distance (Jäger & Weber, 2020): Low-level construals are psychologically close (now, here, self, certain) while high-level construals are psychologically distant (later, there, other, uncertain). Jakubaneč et al. (2018) posited that “people often consider fruits and vegetables inherently nutritious and thus categorize them as virtues that serve the higher-order, long-term goal of healthfulness. Conversely, people often classify indulgent foods (e.g., cake) as vices because they serve the lower-order, short-term goal of indulgence but are detrimental to the higher-order, long-term goal of staying healthy.” Furthermore, Balcetis et al. (2020) demonstrated that health messages with concrete (vs. abstract) language yielded stronger preferences for healthy foods (vs. unhealthy foods),

while Belei et al. (2012) demonstrated that the nature of the food attributes emphasized—that is, hedonic or functional—affects consumption: Emphasizing hedonic (e.g., low fat) vs. functional attributes (e.g., extra antioxidants) for “healthful indulgences” (i.e., foods normally considered unhealthy) increases consumption. Choi and Springston (2014, p. 1058) found that while health and nutrition related claims “enhanced the perceived healthiness of advertised products, respondents evaluated them as less tasty than taste appeals.” They posit that enhanced healthiness appeals work only for perceivably healthy products and not for perceivably unhealthy products.

What the examples above show is that food can be mentally represented at a lower-construal level (texture, caloric content, tastiness, or satiation) or a higher-construal level (pleasure, healthiness, or overall environmental impact). Stimuli that activate or speak to people’s core values or broad bandwidth attitudes should correspond to an abstract construal and psychologically distant entities. In contrast, narrower values and attitudes would be congruent with concrete construal and psychologically near entities: “The choices people make for psychologically distant situations are guided by their general attitudes, core values, and ideologies. As people get psychologically closer to the situation, their choices are increasingly influenced by more specific attitudes, secondary values, and incidental social influences” (Trope & Liberman, 2010, p. 455).

Congruence between an abstract (concrete) construal and psychologically distant (near) events, objects, or situations has been shown to enhance consumers’ processing fluency, which in turn can lead to more favorable evaluations (Lee, 2019; Septianto et al., 2019). However, research has yielded inconsistent results regarding the congruity effect of matching product type (i.e., hedonic vs. utilitarian food) with benefit claim (e.g., taste vs. health; Choi et al., 2012; Kim et al., 2009). Plans for conducting a consumer experiment involve manipulating food advertising claims or message framing to target either concrete (e.g., taste, specific nutrients, carbon emission) or abstract (freshness, well-being, sustainability) benefits to test whether framing will have differential effects on product evaluation (i.e., perceived tastiness and healthiness, attitude, and purchase intention), as well as, likewise, to test whether claims that target immediate (hedonism) vs. future (health/environmental impact) consequences of consumption will have different effects on product evaluation. A recent review (Symmank, 2019) calls for more holistic research designs that combine sensory and consumer research, whereby both intrinsic and extrinsic product attributes simultaneously are taken into consideration. In agreement with this call, one objective of the proposed study is to integrate and measure the effects of manipulations to intrinsic and extrinsic product attributes on consumers’ hedonic evaluation (e.g., liking), cognitive and affective attitudes, and purchase intention and willingness to pay. The experimental setup can further introduce future time perspective, self-control,

and food innovativeness as moderators of the causal relationships. For the time being, the experimental procedure is still in its infancy and will require further elaboration.

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PART 3. PAPERS



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Consumers' attitudes and intentions toward consuming functional foods in Norway

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ABSTRACT

This study investigates antecedents of consumers' attitudes and intentions to eating functional foods in a representative sample of Norwegian consumers ($N = 810$). The theory of planned behavior (TPB), with an extension of self-efficacy and descriptive norms and, as well, hedonic and utilitarian eating values, is used as a conceptual framework. Structural equation modeling (SEM) is applied to test the hypothesized relationships. The findings differed significantly between the basic and extended model, particularly for the perceived behavioral control (PBC) constructs. Perceived control over behavior was insignificantly related to intention and consumption frequency in the basic model and significantly negatively related in the extended model. The inclusion of self-efficacy, conceptualized as confidence in the ability to consume functional foods regularly, proved to be the most important explanatory factor of intention. Descriptive and injunctive norms were both significant and relatively strong predictors of intention. However, injunctive norms lost explanatory power when descriptive norms were included in the structural model. The strong influence of attitude on intention also diminished in the extended model. Utilitarian eating values clearly outperformed hedonic eating values as a basis for explaining consumer attitude toward eating functional foods. Whereas utilitarian eating values were strongly and positively associated with participants' attitude toward the consumption of functional foods, hedonic eating values were less strongly and negatively related to attitude. Thus, the food industry needs to improve the hedonic value of functional foods to commercially succeed.

1. Introduction

Understanding consumer perceptions, attitudes, and purchasing behavior with respect to functional foods is of great importance (Calado et al., 2018; Frewer, Scholderer, & Lambert, 2003; Kraus, 2015). Some recent reviews (Bimbo et al., 2017; Mogendi, De Steur, Gellynck, & Makokha, 2016; Siró, Kápolna, Kápolna, & Lugasi, 2008) highlight knowledge and information about nutrition and health; cognitive and affective antecedents such as attitudes, perceptions and beliefs; product properties; and sociodemographic variables as important for consumer choices regarding functional foods. As for food choice in general (e.g. Pollard, Steptoe, & Wardle, 1998; Steptoe, Pollard, & Wardle, 1995), reasons for buying and/or consuming functional foods are manifold and complex. Although the findings are mixed and contradictory, functional food acceptance is closely related to consumer belief in its overall health benefit or perceived reward of consumption (Siegrist, Shi, Giusto, & Hartmann, 2015; Urala & Lähteenmäki, 2007; Verbeke, 2005); its convenience (Grunert, 2010); the perceived need for

functional foods for society in general; and confidence in and safety of functional foods (Urala & Lähteenmäki, 2007); and, as well, sensory attributes such as (good) taste (Siró et al., 2008; Verbeke, 2006).

Products may provide benefits that are hedonic or utilitarian in nature (Crowley, Spangenberg, & Hughes, 1992; Okada, 2005). Hedonic products provide a more experiential consumption, evoking fun, pleasure, excitement, happiness, fantasy, or enjoyment, whereas utilitarian products are primarily instrumental, functional, goal oriented, and linked to self-control (Alba & Williams, 2013; Dhar & Wertenbroch, 2000; Holbrook & Hirschman, 1982). Hedonic attributes or values are important to food choice in general (Steptoe et al., 1995). While food products certainly have both utilitarian and hedonic qualities (to varying degrees), functional foods—in comparison—are suggested to be superior in providing utilitarian benefits (i.e. additional health benefits and convenience). Thus, this study will investigate whether consumption of functional foods is living up to its “functional terminology,” that is, guided by utilitarian eating motivation, values, and/or goals.

Functional foods are not widespread in the Norwegian marketplace,

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and those that are available are not necessarily marketed as functional foods (i.e. with health claims informing consumers about the benefits of their consumption). Enrichments, which render food items functional, are implemented to many different food items in the various conventional food categories already established, such as dairy products, bakery wares, and prepared foods (Urala & Lähteenmäki, 2004). Little is known about the Norwegian functional food consumer yet, according to a recent report (Euromonitor, 2019), Norwegians are characterized as being highly skeptical of foods with health claims from manufacturers (i.e. functional foods). Nevertheless, functional foods have been recognized as an important avenue for innovation in the converging food and health domain in Norway—despite being costly and time-consuming for manufacturers (Pedersen & Schwach, 2010).

The TPB has been applied to predict and explain a vast number of behaviors (Armitage & Conner, 2001; Godin & Kok, 1996), yet only a few prior studies (e.g. O'Connor & White, 2010; Patch, Tapsell, & Williams, 2005) have investigated consumers' behavior toward functional food using the TPB framework. The current study contributes to the existing literature investigating consumer attitudes, intention, and behavior toward functional foods in three theoretical and empirical areas. First, it proposes and tests an extended version of the TPB (e.g. Rhodes, Blanchard, & Matheson, 2006; Rhodes & Courneya, 2003a) by incorporating descriptive norms (e.g. Ravis & Sheeran, 2003) and self-efficacy (e.g. Terry & O'Leary, 1995) into the model. Different norms are important in explaining consumers' eating behavior (Olsen & Grunert, 2010; Tuu, Olsen, Thao, & Anh, 2008), and self-efficacy is considered to be more predictive of intention than perceived control in the domain of both health (Rodgers, Conner, & Murray, 2008; Terry & O'Leary, 1995) and dietary behavior (Armitage & Conner, 1999a; Povey, Conner, Sparks, James, & Shepherd, 2000a). To our knowledge, few prior studies have used descriptive norms and/or self-efficacy as predictors of functional food consumption intentions (e.g. Vassallo et al., 2009, applying the health belief model). Secondly, this study examines whether functional foods satisfy consumers' utilitarian motivations, goals and values at the expense of—or in combination with—their hedonic counterparts. Successful functional products should be healthy, convenient, and tasty (Siró et al., 2008; Steptoe et al., 1995). Finally, this study, to our knowledge, is the first to explore consumer attitudes and intentions to consume functional foods using a representative sample in Norway.

2. Theoretical framework

The popularity of the TPB can be explained by its outstanding ability to explain individual intention and behavior in a parsimonious structure of attitudes, norms, and control constructs across most kinds of behavioral domains (Fishbein & Ajzen, 2010), including health-related behaviors such as physical activity and smoking (e.g. Godin & Kok, 1996; McEachan, Conner, Taylor, & Lawton, 2011); food consumption (e.g. McDermott et al., 2015; McDermott et al., 2015); and healthy eating habits (e.g. Conner, Norman, & Bell, 2002; Povey, Conner, Sparks, James, & Shepherd, 2000b). Considering consumer behavior toward functional food, only a handful of prior investigations have applied the TPB. Amongst is a study by O'Connor and White (2010) investigating Australian nonusers' willingness to try functional foods (and vitamin supplements), applying a version of the TPB in which intention was replaced by a measure of willingness to try. Another Australian study (Patch et al., 2005) used the TPB to examine intentions to consume foods enriched with omega-3.

Because of its parsimonious structure, several extended versions of the TPB have been proposed in attempts to increase its predictive ability, understanding its background factors (e.g. personality, values, demographics) or adapt to contextual environments or unconscious habits (e.g. Ajzen, 2011; Conner, 2015; Conner & Armitage, 1998). Many additional predictors have been proposed along two lines of development: (a) the multicomponent approach, which reconceptualizes

the theory's major constructs (e.g. attitude, subjective norm); and (b) the approach of adding new variables in order to expand the initial model (e.g. self-identity, past behavior, and habit strength; for a review, see Conner & Sparks, 2005). In a series of studies (Rhodes & Courneya, 2003a,b, 2004; Rhodes et al., 2006), Rhodes and colleagues have investigated multiple components of the TPB, conceptualizing attitude, perceived behavioral control (PBC) and subjective norm either as two subcomponents (e.g. control vs. self-efficacy) or a general common factor (e.g. PBC). An alternative to their formative component model (Rhodes & Courneya, 2003a) is the reflective higher-order model proposed by Hagger and Chatzisarantis (2005). Both models are based on similar principles and differ only in the causal relationship (i.e. formative vs. reflective) assumed between the models' first- and second-order components (for a comprehensive discussion of the distinction between formative and reflective models, see Jarvis, MacKenzie, & Podsakoff, 2003). Yet other scholars have focused on multiple conceptualizations of subjective norms (e.g. Ravis & Sheeran, 2003); PBC (e.g. Terry & O'Leary, 1995); and attitude (e.g. Conner, Godin, Sheeran, & Germain, 2013) separately.

The current research contributes to this literature by including hedonic and utilitarian dimensions of consumer attitudes, values, and/or goals (Babin, Darden, & Griffin, 1994; Dhar & Wertenbroch, 2000; Voss, Spangenberg, & Grohmann, 2003), descriptive norms (Ravis & Sheeran, 2003) in addition to subjective (injunctive) norms, and self-efficacy (Terry & O'Leary, 1995) in addition to PBC (controllability) in order to improve the understanding and predictive power of consumers' motivation to consume functional foods in Norway. Fig. 1 depicts our conceptual framework. A discussion of the constructs and their relationships immediately follows.

2.1. Intention and consumption frequency

Intention to perform a given behavior exerts a motivational influence on the actual performance of the behavior and is its immediate antecedent (Fishbein & Ajzen, 2010). "The assumption is that people do what they intend to do and do not do what they do not intend" (Sheeran, 2002, p. 1). According to Ajzen (1991), the stronger the intention to perform a behavior, the more likely is its actual performance. Sheeran (2002) provides a meta-analysis of the intention-behavior relationship, demonstrating that intention on average contributes to explaining 28% of the variance in behavior. Thus, 72% of the variance is attributed to something else. This intention-behavior gap is also evident in predicting food-related behaviors. Dunn, Mohr, Wilson, and Wittert (2011) suggest that one explanation of the poor predictive ability of this relationship might be attributed to the complex nature of food consumption. However, its predictive ability varies and, according to another meta-analysis (McEachan et al., 2011), intention to engage in dietary behavior predicts actual behavior quite well. Moreover, behavioral intention significantly predicts eating behavior, including healthy eating behavior (Conner et al., 2002).

Most studies applying the TPB framework use a prospective design and measure behavioral responses days, weeks, or months after measuring attitudes and intentions (Fishbein & Ajzen, 2010). This behavioral construct is suggested to be different from cross-sectional studies assessing current and past behavior. However, retrospective behavior can be a satisfactory proxy for future behavior (Ajzen, 2002c). Jaccard and Blanton (2014, p. 147) suggest that, for behaviors that are stable over time, "cross-sectional analyses can be just as informative as longitudinal analyses" because the behavioral estimate is likely to be the same over time. In order to avoid any confusion between future and past behavior in TPB, this study uses the term "consumption frequency" as a proxy for the behavioral construct. Accordingly, the first hypothesis is:

H₁. Intention to consume functional foods is positively related to consumption frequency.

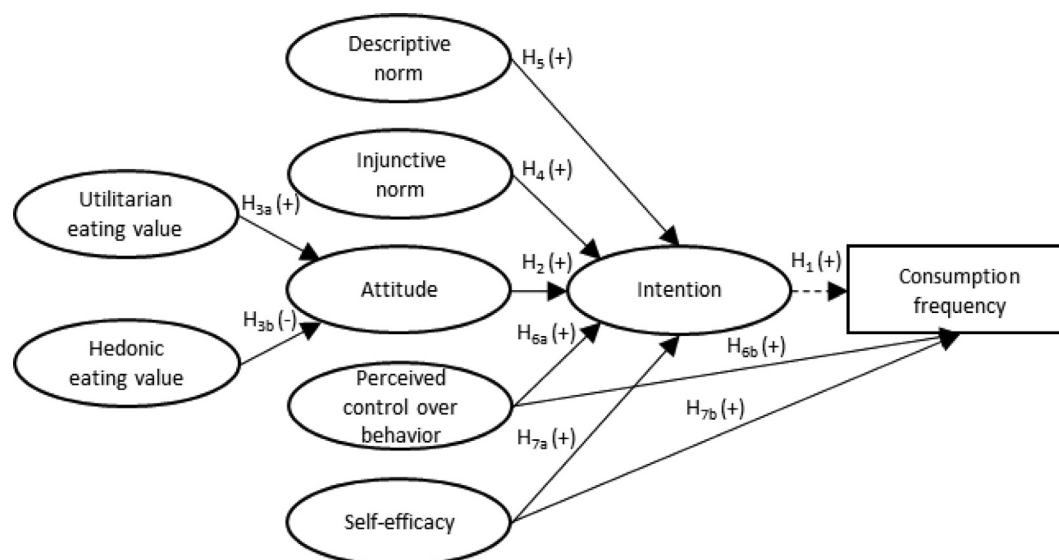


Fig. 1. Full conceptual model with hypotheses explaining attitude toward, intentions to eat, and consumption frequency of functional foods (extended model). Ovals are latent constructs, whereas the rectangle is an observed variable. The dashed line suggests a cautionary take on interpretation of the causal relationship from intention (future) to consumption frequency (past).

2.2. Attitude

Attitude is “a latent disposition or tendency to respond with some degree of favorableness or unfavorableness to a psychological object” (Fishbein & Ajzen, 2010, p. 76), which refers to the positive or negative evaluation of the outcome associated with performing a given behavior such as consuming functional food. Attitudes are multifaceted, including hedonic/affective and utilitarian/cognitive dimensions¹ (Crites, Fabrigar, & Petty, 1994; Voss et al., 2003). Following Voss et al. (2003), the hedonic dimension is characterized by the sensations derived from experiencing products (e.g. pleasure), whereas the utilitarian dimension is derived from the functions provided by products (e.g. nutritional composition). Within the food domain, attitude often shares the strongest association with intention (McDermott et al., 2015; McDermott et al., 2015; Povey et al., 2000b), including behavior toward functional food (Hung, de Kok, & Verbeke, 2016; O’Connor & White, 2010; Patch et al., 2005). In their study of functional foods enriched with omega-3, Patch et al. (2005) found attitude to be the only significant predictor of intention to consume. Along the same lines, Hung et al. (2016) demonstrated that attitude was the most important determinant for the purchasing intention of a new functional meat product. Accordingly, the second hypothesis is:

H₂. Attitude toward eating functional foods is positively related to intention.

2.2.1. Hedonic and utilitarian eating values

Consumer choice is driven by hedonic and utilitarian considerations (Dhar & Wertenbroch, 2000), and consumption takes place for hedonic gratification from sensory attributes (e.g. good taste) and for utilitarian reasons (e.g. to curb hunger, to stay healthy; Batra & Ahtola, 1990). Values precede attitudes and “constitute the most abstract level of cognition, not specific in relation to situations or objects, but influencing the perception and evaluation of these” (Brunso, Scholderer, & Grunert, 2004, p. 195). Otherwise put, values influence the evaluation of attitude objects (e.g. Dreezens, Martijn, Tenbült, Kok, & de Vries, 2005; Homer & Kahle, 1988; Schwartz & Bilsky, 1987), including attitudes toward functional foods (Tudoran, Olsen, & Dopico, 2009).

¹ This is also referred to as experiential and instrumental, respectively (Fishbein & Ajzen, 2010).

According to Vinson, Scott, and Lamont (1977), values can be conceptualized as three hierarchical levels along a central-peripheral continuum: global or personal values, domain-specific values, and evaluation of product attributes.

Food values (or eating values) are domain-specific and constitute motivational considerations influencing the choice of foods—quite similar to what Steptoe et al. (1995) refer to as food choice motives. Both constructs consider the underlying reasons for the selection of food, determined and distinguished by means of the relative importance attached to consumers’ various food values/food choice motives. Similar to attitudes and goals, eating values are considered to include both utilitarian and hedonic outcomes of behavior (Babin et al., 1994). Related to food choice and consumption, utilitarian values typically include considerations of convenience, nutrition, and other health-related aspects, whereas hedonic eating values are all about the importance placed on sensory characteristics pertaining to taste and pleasure (e.g. Lusk & Briggeman, 2009).

Prior research has demonstrated a strong association of naturalness, natural content, fairness, environmental concerns, and political values with people’s attitudes and preferences toward organic food (Chen, 2007; Lusk & Briggeman, 2009). Likewise, Sun (2008) found that consumers’ attitudes toward healthy eating were strongly influenced by health concerns, while Pieniak, Verbeke, Vanhonacker, Guerrero, and Hersleth (2009) demonstrated a significant influence of familiarity on attitudes toward traditional foods. Žeželj, Milošević, Stojanović, and Ognjanov (2012) found that health and natural content, sensory appeal, and mood are all predictive of attitude toward functional foods. The importance of health in food choices is a key motive; it has been found to be positively related to functional food attitudes (Hauser, Nussbeck, & Jonas, 2013; Tudoran et al., 2009). Furthermore, people’s willingness to pay a premium for a functional snack food (vs. a generic snack food) varies with their food values (Pappalardo & Lusk, 2016). Olsen and Tuu (2017) found that, whereas hedonic eating values (e.g. taste, enjoyment) increased consumption of convenience foods (e.g. hamburgers, pizza, snacks), utilitarian eating values (e.g. health, weight management) had the opposite influence on consumption. In the context of functional foods, we expect the contrary. Accordingly, the following hypotheses are proposed:

H₃. Utilitarian eating values are positively associated with attitude (H_{3a}), whereas hedonic eating values are negatively associated with attitude (H_{3b}).

The relevance of these hypotheses is particularly important to the functional food industry. Successful (functional) food products should be both functional and hedonic to satisfy consumer's food choice and loyalty to those products (Siró et al., 2008; Steptoe et al., 1995; Verbeke, 2006).

2.3. Subjective norms

Subjective norms reflect perceived social pressure to display a behavior which significantly contributes to the prediction of intention to engage in healthy dietary behaviors (McEachan et al., 2011)—although research is inconclusive in this area (e.g. Conner et al., 2002). The initial and probably the most widely used conceptualization within the TPB concerns injunctive norms, i.e. “perceptions concerning what should or ought to be done with respect to performing a given behavior” (Fishbein & Ajzen, 2010, p. 131). Injunctive norms thus reflect social pressure through the perception of what others approve or disapprove regarding one's conduct (Cialdini, Kallgren, & Reno, 1991). This conceptualization of subjective norms has received considerable attention in that it performs poorly within the TPB (i.e. exerts weak predictive power; Armitage & Conner, 2001). Conner and Sparks (2005), for instance, demonstrated that subjective norms were the weakest predictor of intention in a meta-analysis of meta-analyses (bearing a beta value of 0.15). Another meta-analysis (McEachan et al., 2011) found subjective norms to be more strongly associated with intention in studies employing the TPB to investigate dietary behaviors.

Descriptive norms, on the other hand, tap social pressure through what others themselves do, and reflect what is perceived to be normal conduct with respect to a behavior (Cialdini, Reno, & Kallgren, 1990). Adding descriptive norms in the prediction of intention has been found to increase explained variance after controlling for other TPB variables (Rivis & Sheeran, 2003; Sheeran & Orbell, 1999), although such evidence has been inconclusive (e.g. Povey et al., 2000b). A meta-analysis (Manning, 2009) of 196 studies provided evidence of descriptive norms and injunctive norms being conceptually different constructs within the TPB. Descriptive norms have been found to exert an influence on the intention to consume fish (Tuu et al., 2008). They also were found to predict healthy vs. unhealthy food choices, i.e. selecting a snack consistent with one's perceptions of what others before have chosen (Burger et al., 2010) and, as well, to predict vegetable intake (Stok, Verkooijen, de Ridder, de Wit, & de Vet, 2014). The latter study also showed that “a majority descriptive norm increased self-identification, positive attitudes, and self-efficacy regarding vegetable intake behavior” (p. 245). Furthermore, Robinson, Fleming, and Higgs (2014) found descriptive social norm messages (i.e. information about what others do) to be more effective than health messages in prompting healthier eating; indeed, a recent review and meta-analysis (Robinson, Thomas, Aveyard, & Higgs, 2014) concluded that providing social eating normative information (i.e. suggesting that other people are eating healthily) influenced both the quantity and types of food people chose to consume. In summary, both injunctive and descriptive norms exert predictive ability on the formation of dietary intentions, although to varying degrees and certainly not in every instance. From the above discussion, the next two hypotheses follow:

H₄. Injunctive norms are positively associated with intentions to consume functional foods.

H₅. Descriptive norms are positively associated with intention to consume functional foods.

2.4. Perceived control over behavior and self-efficacy

The construct of PBC was added to the theory of reasoned action (TRA) to account for behaviors in which people have incomplete volitional control, and “refers to people's perception of the ease or difficulty of performing the behavior of interest” (Ajzen, 1991, p. 183). A person's PBC influences his or her intention to perform a given behavior and

actual performance of that behavior; it is posited to concern both perceptions of controllability (external control) and self-efficacy (internal control; Fishbein & Ajzen, 2010). Related to dietary behaviors in general, PBC exerts moderately to strong influence on both behavioral intention and behavior (McEachan et al., 2011). The construct bears much in common with Bandura (1982) self-efficacy concept, which “centers on people's sense of personal efficacy to produce and to regulate events in their lives” (p. 122). Ajzen (1991) initially argued that PBC and self-efficacy were two sides of the same coin. Empirical evidence, however, supports a distinction between the two concepts, which has made him revisit and modify the relationship between the two: “perceived behavioral control is the overarching, superordinate construct that is comprised of two lower-level components: self-efficacy and controllability” (Ajzen, 2002b, p. 680).

Armitage and Conner (1999a) coined the term “perceptions of control over the behavior” (PCB) to distinguish it from self-efficacy (and from PBC). Whereas self-efficacy taps into an individual's confidence in his or her ability to perform a behavior (e.g. competence), PCB deals with external factors that may exert influence upon one's perceived control over carrying out that behavior (e.g. availability). As is true for all TPB variables, an important aspect in the conceptualization of self-efficacy is the level of specificity: “self-efficacy does not refer to a general personality characteristic; instead, it may vary greatly within each person from task to task” (AbuSabha & Achterberg, 1123, 1997). Thus, as Bandura (1986) points out, measures of self-efficacy should target specific behaviors such as confidence in one's ability to eat functional food regularly.

One theoretical reason for making a distinction between two forms of perceived behavioral control has been developed by Terry and colleagues (e.g. Terry & O'Leary, 1995), who propose that ability and motivation (i.e. self-efficacy) come from within the individual (internal control), while factors such as task difficulty, access to necessary resources, or luck (i.e. control) are derived from outside the individual (external control; see also Manstead & van Eekelen, 1998). For instance, “a person may perceive few external barriers to performing the [behavior], yet lack confidence in his or her ability to do so” (Terry & O'Leary, 1995, p. 202). In opposition to this view, Sparks, Guthrie, and Shepherd (1997) argue that the PBC construct instead consists of perceived difficulty and perceived control, the latter referring to an individual's perception of control over his or her behavior. The former refers to how easy or difficult it is anticipated to be to engage in the behavior in question. As such, they argue for retaining “an interpretation of PBC that includes reference to internal and external constraints” (p. 431). Another argument is the self-efficacy-as-motivation, in which “can do” operationalizations reflect motivation rather than perceived capacity, i.e. “self-efficacy ratings are highly predictive of [behavior] merely because such ratings reflect a broad range of [behavioral] motives” (Williams & Rhodes, 2016, p. 124). The predictive ability of self-efficacy with respect to behavior thus translates into people likely engaging in behaviors about which they are motivated.

Research using the TPB and applying separate measures of self-efficacy and PCB (Armitage & Conner, 1999b; Terry & O'Leary, 1995; Trafimow, Sheeran, Conner, & Finlay, 2002) has found evidence of the two constructs influencing intention differently—and, in some instances, that PCB negatively influences intention. Povey et al. (2000a) propose that the predictive ability of the TPB may be improved, not only by including self-efficacy, but rather by replacing the PBC component (i.e. controllability) with self-efficacy. In contrast, Conner et al. (2002) found that a construct combining both control and self-efficacy measures exerts the strongest influence on participants' intention to eat healthily. Studies conceptualizing self-efficacy and control as two distinct constructs have usually demonstrated a relatively stronger relationship between self-efficacy and intention and self-efficacy and attitude as compared to control (for a meta-analytic review, see Armitage & Conner, 2001; Manstead & van Eekelen, 1998; Terry & O'Leary, 1995). These effects have been found to apply as well to the food

domain (e.g. low-fat diet, consumption of fruits and vegetables; Armitage & Conner, 1999a; Povey et al., 2000a). Self-efficacy (within the protection motivation theory; Maddux & Rogers, 1983) has also been demonstrated to be a strong predictor of intention to consume and buy functional food products (Cox & Bastiaans, 2007; Cox, Koster, & Russell, 2004). The following hypotheses are thereby proposed:

H₆. Perceived control over behavior (PCB) is positively associated with intention to consume (H_{6a}) and consumption frequency (H_{6b}) of functional foods.

H₇. Self-efficacy is positively associated with intention to consume (H_{7a}) and consumption frequency (H_{7b}) of functional foods.

3. Materials and methods

3.1. Data collection and sample

A sample of Norwegian consumers representative for gender, age, and region responded to an online survey in January of 2019. The sample consisted of 810 adult participants between the ages of 18 and 74 years, of whom 49% were female. The majority of respondents (54.4%) were well-educated (university or university college), and most live in households without children present (71.9%). The data collection was administered by YouGov by use of its consumer panel. Table 1 summarizes some sociodemographic characteristics of the sample.

3.2. Measures

The survey introduced the participants to a definition of functional foods based on Doyon and Labrecque (2008) and Laros and Steenkamp (2005), stating that this term refers to food products that have been enriched with minerals, vitamins, fatty acids, or proteins to make them healthier or to prevent diseases. Further, functional foods are part of a standard diet consumed on a regular basis and in normal quantities. Some examples of functional foods available in Norwegian retailing were proposed, including milk and other dairy products with added vitamin D. The behavior in question was defined as “eating functional foods regularly.” Seven-point Likert-type scales with response categories ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) were used for all measures, unless explicitly stated otherwise. The overall structure of the survey instrument was fixed, yet the order of items designed to measure each construct was randomized.

Consumption of functional foods (CF) was assessed with a single measure: “On average during the last 6 months, how often have you consumed functional foods?” The scale was scored from 1 (*never/seldom*) to 7 (*several times per day*). A similar measure of food

Table 1
Socio-demographic characteristics (N = 810).

Variables	Per cent
Gender	
Male	49.4
Female	50.6
Age	
Under 30 years	20.0
30–39 years	21.1
40–49 years	19.0
50–59 years	18.6
Over 60 years	21.2
Children living at home	
Yes	28.1
No	71.9
Highest education level	
Primary and lower secondary school	7.8
Upper secondary school	37.8
University or university college (1–3 years)	28.4
University or university college (4 years or more)	26.0

consumption frequency is presented in Goetzke, Nitzko, and Spiller (2014).

Intention (INT) was measured with three items adopted from Conner et al. (2002) and Fishbein and Ajzen (2010): “I intend to eat functional foods regularly”; “I expect to eat functional foods regularly”; “I plan to eat functional foods regularly.” Participants rated the items on a Likert-type scale from 1 (*highly unlikely*) to 7 (*highly likely*).

Attitude (ATT) was measured using three items along a 7-point semantic differential scale. In accordance with recommendations and praxis (Fishbein & Ajzen, 2010; Kraft, Rise, Sutton, & Røysamb, 2005), both a hedonic and utilitarian dimension of attitude were considered in addition to a measure of global evaluation. Subjects responded to the stem, “Eating functional foods regularly would be ...”, followed by the three adjective pairs bad-good (global), dull-exciting (hedonic), and foolish-wise (utilitarian) (Crites et al., 1994; Voss et al., 2003).

Eating values were measured using six items following the stem, “It is important to me that the foods I eat ...”, wherein three items were designed to tap hedonic values (HED) and the other three items utilitarian values (UT). All items were adapted from Olsen and Tuu (2017) and inspired by Voss et al. (2003) and Babin et al. (1994). The three items reflecting *hedonic eating values* were “are fun to eat”; “provide me good sensory feelings (good taste, smell, appearance, appeal)”; and “are enjoyable to eat”, whereas items tapping *utilitarian eating values* were “do not increase my weight”; “help me to avoid health issues”; and “help me to control my weight.”

Subjective norms were measured by six items reflecting both *injunctive norms* (IN) and *descriptive norms* (DN) (Dunn et al., 2011; Rhodes et al., 2006). The three items measuring injunctive norms were: “Most people who are important to me [think that I should/expect me to/would want me to] eat functional foods regularly.” The three descriptive norms items were: “Most people who are important to me eat functional foods regularly”; “Most people like me eat functional foods regularly”; “How many of the people who are important to you do you think eat functional foods regularly?” The latter scale was scored from 1 (*none*) to 7 (*all*) (White, Smith, Terry, Greenslade, & McKimmie, 2009).

The participant’s PCB was measured with six items reflecting *perceived control over behavior* (PCB) and *self-efficacy* (SE), as frequently used in previous studies (Armitage & Conner, 1999a; Dunn et al., 2011; Hagger & Chatzisarantis, 2005; Rhodes & Courneya, 2003b). The three items designed to capture PCB were: (1) “I have complete control over whether or not to eat functional foods regularly”; (2) “Eating functional foods regularly is beyond my control” (reverse scored); and (3) “Whether or not I eat functional foods regularly is entirely up to me.” The items measuring self-efficacy were: (1) “If it were entirely up to me, I am confident that I would be able to eat functional foods regularly”; (2) “If I wanted to, I could avoid eating functional foods regularly”; and (3) “I believe I have the ability to eat functional foods regularly.”

3.3. Analytical procedures

Initial analyses using SPSS version 25 explored data and confirmed the normality of distributions, while a two-stage procedure (Anderson & Gerbing, 1988) in AMOS version 25 was used for confirmatory factor analyses (CFA) and structural equation modeling (SEM). Convergent and discriminant validity of constructs were established by estimation of average variance explained (AVE) and maximum shared variance (MSV), respectively. Adequate convergent validity is reached when AVE > 0.5, whereas discriminant validity is present when AVE > MSV. To further establish discriminant validity, the square root of AVE should be greater than the correlations between constructs. Additionally, a series of four confirmatory-factor models with chi-square difference tests were employed to substantiate evidence of discriminant validity between one-factor and two-factor solutions of subjective norms and PCB (e.g. subjective norms vs. injunctive and descriptive norms). Finally, the threshold for construct reliability is CR > 0.7 (Hair, Black, Babin, & Anderson, 2013).

Table 2
Standardized factor loadings, reliability and validity.

Constructs and items	Factor loadings	Composite reliability	Average variance extracted
Intention (INT)		0.95	0.88
I intend to eat functional foods regularly	0.94		
I expect to eat functional foods regularly	0.92		
I plan to eat functional foods regularly	0.95		
Attitude (ATT)		0.87	0.69
“Eating functional foods regularly would be ...”			
Bad-Good	0.82		
Unenjoyable-Enjoyable	0.81		
Foolish-Wise	0.86		
Hedonic eating value (HED)		0.89	0.73
“It is important to me that the foods I eat ...”			
Are fun to eat	0.87		
Provide me good sensory feelings (good taste, smell, appearance, appeal)	0.81		
Are enjoyable to eat	0.87		
Utilitarian eating value (UT)		0.83	0.63
“It is important to me that the foods I eat ...”			
Do not increase my weight	0.86		
Help me to avoid health issues	0.65		
Help me to control my weight	0.85		
Injunctive norm (IN)		0.95	0.87
“Most people who are important to me ...”			
Think that I should eat functional foods regularly	0.96		
Expect me to eat functional foods regularly	0.90		
Would want me to eat functional foods regularly	0.95		
Descriptive norm (DN)		0.93	0.86
“Most people ...”			
Like me eat functional foods regularly	0.94		
Who are important to me eat functional foods regularly	0.92		
Perceived control over behavior (PCB)		0.72	0.56
I have complete control over whether or not to eat functional foods regularly	0.73		
Whether or not I eat functional foods regularly is entirely up to me	0.77		
Self-efficacy (SE)		0.78	0.64
I believe I have the ability to eat functional foods regularly	0.80		
If it were entirely up to me, I am confident that I would be able to eat functional foods regularly	0.80		

A measurement model with eight latent variables was specified, wherein INT, ATT, IN, DN, PCB, SE, HED, and UT were included. CF was included as an observed variable. A combination of absolute and incremental model fit indices was reported, including the root mean square error of approximation (RMSEA), comparative fit index (CFI), standardized root mean square residual (SRMR), and the Tucker-Lewis Index (TLI), all of which are sample size-independent (Marsh et al., 2009). The traditional chi-square goodness-of-fit test was left out due to sample size-dependency issues (Marsh & Hocevar, 1985). Threshold values of fit indices reported were RMSEA < 0.07; CFI > 0.92; SRMR < 0.08; TLI > 0.92 (Hair et al., 2013, p. 584, Table 4). Common method bias was assessed by controlling for the effects of an unmeasured latent factor (Podsakoff, MacKenzie, Lee, & Podsakoff,

2003). Thus, a second measurement model allowed all items to load simultaneously on their theoretical constructs and on a common latent factor. Differences in standardized regression weights between the two measurement models should not be substantial. To examine whether the extended model outperformed the basic TPB model, two structural models were specified and compared. The extended model included SE, DN, and HED and UT in addition to ATT, IN and PCB.

4. Results

4.1. Reliability and validity of measures

The initial measurement model was composed of 24 items reflecting

Table 3
Correlation matrix and descriptive statistics for study variables.

	INT	ATT	HED	UT	IN	DN	PCB	SE	CF
INT	–								
ATT	0.70***	–							
HED	0.09*	0.15***	–						
UT	0.32***	0.35***	0.51***	–					
IN	0.71***	0.56***	0.04	0.25***	–				
DN	0.72***	0.54***	0.04	0.23***	0.72***	–			
PCB	0.19***	0.24***	0.43***	0.26***	0.09*	0.13**	–		
SE	0.72***	0.67***	0.31***	0.40***	0.53***	0.58***	0.59***	–	
CF	0.48***	0.35***	0.01	0.19***	0.36***	0.41***	0.08*	0.40***	–
Mean	4.05	4.72	5.45	5.11	3.78	3.80	4.89	4.55	2.87
SD	1.56	1.31	1.12	1.16	1.51	1.44	1.23	1.30	1.66

Note. *** p < .001; ** p < .010; * p < .050.

Table 4
Structural equation models and fit indices.

	Basic model		Extended model		Hypothesis testing
	Std β	t-values	Std β	t-values	
<i>Dependent variable: Consumption frequency (CF)</i>					
Intention (INT)	0.48	14.49***	0.29	5.04***	H ₁ supported
Perceived control over behavior (PCB)	-0.01	-0.24	-0.16	-2.64**	H _{6b} not supported
Self-efficacy (SE)	-	-	0.29	3.45***	H _{7b} supported
<i>Dependent variable: Intention (INT)</i>					
Attitude (ATT)	0.43	12.52***	0.29	11.12***	H ₂ supported
Injunctive norm (IN)	0.47	15.36***	0.24	6.15***	H ₄ supported
Descriptive norm (DN)	-	-	0.23	5.31***	H ₅ supported
Perceived control over behavior (PCB)	0.05	1.84	-0.18	-3.80***	H _{6a} not supported
Self-efficacy (SE)	-	-	0.46	7.08***	H _{7a} supported
<i>Dependent variable: Attitude</i>					
Utilitarian eating value (UT)	-	-	0.45	9.01***	H _{3a} supported
Hedonic eating value (HED)	-	-	-0.09	-2.03*	H _{3b} supported
R ² (%) Consumption frequency	22.9		23.0		
R ² (%) Intention	64.8		70.5		
R ² (%) Attitude	-		16.4		
Model fit indices:					
χ^2 (df)	143.91 (48)		893.89 (186)		
RMSEA	0.05		0.07		
CFI	0.99		0.95		
SRMR	0.03		0.12		
TLI	0.98		0.94		

Note. *** $p < .001$; ** $p < .010$; * $p < .050$.

eight latent constructs and one observed variable (consumption frequency). Two items measuring SE and PCB were omitted due to low factor loadings (0.15 and 0.37, respectively), whereas a third item measuring DN was dropped based on a screening of standardized residual covariances (i.e. 41% of residuals above 2.0 in absolute value). The omitted items were: "If I wanted to, I could avoid eating functional foods regularly"; "Eating functional foods regularly is beyond my control" (reverse scored); and "How many of the people who are important to you do you think eat functional foods regularly?", respectively. The final measurement model suggests adequate model fit, χ^2 (175) = 559.58; RMSEA = 0.05; CFI = 0.97; SRMR = 0.05; TLI = 0.96. Convergent and discriminant validity of latent variables was achieved as AVE > 0.5 and AVE > MSV, respectively. Additionally, the square root of AVE was greater than the correlations between variables. Construct reliability for each latent variable was above the threshold value of 0.7.

A series of CFAs suggested that two-factor solutions outperformed one-factor solutions. When IN and DN were combined to reflect a single social pressure construct, model fit was significantly worse, χ^2 (5) = 680.72; RMSEA = 0.41; CFI = 0.84; SRMR = 0.10; TLI = 0.68, as compared to a two-factor solution, χ^2 (4) = 26.24; RMSEA = 0.08; CFI = 1.00; SRMR = 0.02; TLI = 0.99. A similar result applied to a comparison between a single PCB factor, χ^2 (2) = 166.72; RMSEA = 0.32; CFI = 0.82; SRMR = 0.10; TLI = 0.47 vs. SE and PCB as two factors, χ^2 (1) = 3.20; RMSEA = 0.05; CFI = 1.00; SRMR = 0.01; TLI = 0.99. Initial examination of the effect of a common latent factor to the measurement model showed a case of negative error variance to one of the two PCB indicators. Hence, constraints were imposed to regression weights from PCB to its two indicators (specified to be equal) and the variance of PCB was specified to equal "1." Common method bias did not pose a serious threat, although the common latent factor caused a notable reduction in standardized regression weights for two indicators of HED (0.206 and 0.205). The magnitude of influence was still considered moderate. Standardized factor loadings and construct reliabilities for the measurement model are presented in Table 2.

The results suggest that participants, on average, neither found it likely nor unlikely to engage in regular consumption of functional foods

(INT = 4.05).² Attitudes toward eating functional foods regularly were moderately positive (ATT = 4.72), and both hedonic and utilitarian eating values were considered important to food consumption (HED = 5.45; UT = 5.11). The participants considered social pressure to consume functional foods to be somewhat low (IN = 3.78; DN = 3.80). Furthermore, they perceived themselves to be in control over whether to engage in functional food consumption; they also had confidence in their ability to do so (PCB = 4.89; SE = 4.55). Regarding consumption of functional foods, 35.7% of respondents claimed to consume functional foods more than once a week, whereas 29.3% reported to have rarely or never consumed such food products. Correlations between some of the constructs were high (around 0.70). Especially highly correlated were INT, ATT, IN, DN, and SE. Our results indicated satisfactory discriminant validity between constructs. Table 3 displays the intercorrelations and descriptive statistics.

4.2. Tests of structural models

The extended model formed the basis for hypothesis testing. Both the basic and the extended models demonstrated adequate fit to the data (RMSEA = 0.05–0.07; CFI = 0.95–0.99; SRMR = 0.03–0.12; TLI = 0.94–0.98), except for an SRMR index of 0.12 for the extended model. Intention ($\beta = 0.29$, $t = 5.04$, $p < .001$) and self-efficacy ($\beta = 0.29$, $t = 3.45$, $p < .001$) are both significant in explaining retrospective consumption frequency, supporting hypotheses H₁ and H_{7b}, respectively. The factor PCB ($\beta = -0.16$, $t = -2.64$, $p < .01$) was also a significant predictor of consumption frequency, but the direction of the relationship was negative and hence not in support of hypothesis H_{6b}. The data showed that attitude ($\beta = 0.29$, $t = 11.12$, $p < .001$), injunctive norms ($\beta = 0.24$, $t = 6.15$, $p < .001$), descriptive norms ($\beta = 0.23$, $t = 5.31$, $p < .001$), PCB ($\beta = -0.16$, $t = -2.64$, $p < .001$), and self-efficacy ($\beta = 0.46$, $t = 7.08$, $p < .001$) significantly explained intention. The direction of the relationship between PCB and intention was negative and not in support of hypothesis H_{6a}. Hypotheses H₂, H₄, H₅, and H_{7a}, however, were supported. Next, results demonstrated a strong positive influence of utilitarian eating

² Mean score on a 7-point scale.

values on attitude ($\beta = 0.45$, $t = 9.01$, $p < .001$), whereas hedonic eating values was negatively associated with attitude ($\beta = -0.09$, $t = -2.03$, $p < .05$). This is supportive of hypotheses H_{3a} and H_{3b} , respectively. Hedonic and utilitarian eating values, taken together, explained 16.4% of the variance in attitude. The extended model explained an additional 5.7% of the variance in intention, as compared to the basic model. Inclusion of descriptive norms, self-efficacy, and hedonic eating values made no additional contribution to the variance explained in consumption frequency.

In comparing the basic and the extended model, several interesting findings are observed. In the basic model, intention was only influenced by injunctive norms ($\beta = 0.47$, $t = 15.36$, $p < .001$) and attitude ($\beta = 0.43$, $t = 12.52$, $p < .001$), whereas PCB ($\beta = 0.05$, $t = 1.84$, $p = .065$) failed to reach significance. Conversely, in the extended model, self-efficacy ($\beta = 0.46$, $t = 7.08$, $p < .001$) clearly was the strongest contributor in predicting intention. Attitude ($\beta = 0.29$, $t = 11.12$, $p < .001$), injunctive norms ($\beta = 0.24$, $t = 6.15$, $p < .001$) and descriptive norms ($\beta = 0.23$, $t = 5.31$, $p < .001$) also made considerable positive contributions, while PCB ($\beta = -0.16$, $t = -2.64$, $p < .001$) had a negative influence on intention. Considering consumption frequency, only intention ($\beta = 0.43$, $t = 14.49$, $p < .001$) significantly explained CF in the basic model ($R^2 = 22.9\%$). In the extended model, both intention ($\beta = 0.29$, $t = 5.04$, $p < .001$) and self-efficacy ($\beta = 0.29$, $t = 3.45$, $p < .001$) were strongly and positively associated with consumption frequency, whereas the direction of relationship between PCB and consumption frequency was negative ($\beta = -0.16$, $t = -2.64$, $p < .01$). Explained variance in consumption frequency was 23.0%.

5. Discussion

This research investigated the ability of an extended TPB framework to explain functional food consumption among Norwegian consumers, incorporating multicomponent measures of attitude formation, norms, and PCB. Most of our expectations were confirmed. For instance, intention was positively associated with consumption frequency, which implies that prior experience with functional foods generates future intention to consume. Attitude was strongly associated with intention within the basic TPB framework, a finding that corresponds with prior research on functional foods (Hung et al., 2016; Patch et al., 2005). Although attitudes were positive toward this type of diet, they might still be weak due to functional foods not being too widespread or familiar to Norwegians. Furthermore, consumers were found to appreciate both hedonic and utilitarian eating values. Examining their simultaneous influence on attitude suggests that utilitarian (vs. hedonic) eating values exert a strong positive (vs. weak negative) influence on attitude toward eating functional foods. This corresponds well with the notion of functional foods being primarily utilitarian in nature, targeting consumers who find health and nutrition to be important food-choice criteria.

Subjective norms (i.e. injunctive norms) were found to exert a strong influence on intention within the basic model. This is congruent with previous studies (Conner et al., 2002; McEachan et al., 2011), although the predictive power within the food consumption domain has been known to vary. A multicomponent conceptualization of social pressure (i.e. descriptive and injunctive norms) suggests the two to be strongly correlated but nonetheless superior to a single-factor solution following chi-square difference testing. The relationship between the two norm constructs was stronger than what is usually found (for a meta-analysis, see Rivis & Sheeran, 2003). Whereas injunctive norms were the strongest predictor of intention in the basic model, adding descriptive norms (and self-efficacy) to the model decreased the influence of both norm dimensions relative to self-efficacy. Injunctive and descriptive norms shared a similar positive association with intention. That is, consumers' intention to eat functional foods was strongly influenced by social pressures exerted by significant others' functional

food consumption—and, as well, significant others' expectations as to what you yourself should do. The role of social norms within the area of food consumption is known to vary, whereas a meta-analysis (McEachan et al., 2011) showed large effects, while others (e.g. Conner et al., 2002) showed a small or no effect. Emphasizing social norms might prove to be beneficial in the marketing of functional foods. Including descriptive norms could contribute to extending understanding of the social-pressure construct in explaining consumers' intention to consume functional foods.

The PCB construct failed to reach statistical significance as a predictor of intention and consumption frequency in the basic model. This was not quite in accordance with our expectations, but similar weak relationships have been demonstrated through meta-analysis (Armitage & Conner, 2001); also, Conner et al. (2002) found no significant association between control and eating a healthy diet. The extended model demonstrated the strong influence of self-efficacy on intention, providing evidence of the importance of expanding the controllability dimension to include a measure of confidence in the ability to perform the behavior in question (i.e. self-efficacy). We are not aware of any study investigating the role of self-efficacy on intention to buy or consume functional food products within a TPB framework, but our empirical finding is congruent with a meta-analysis by Armitage and Conner (2001) and a study by Povey et al. (2000a) into dietary behaviors, which demonstrated that self-efficacy was more strongly related to intention than was PCB. Thus, motivation to engage in consumption of functional foods largely depended on consumers' confidence in their ability to do so.

The strong association between self-efficacy and intention, however, could be attributed to the self-efficacy-as-motivation argument, which holds that “self-efficacy ratings reflect the broader concept of motivation, rather than perceived capability” (Williams & Rhodes, 2016, p. 118). Rhodes and Courneya (2004), for example, have argued that measures of self-efficacy (and control) can be confounded with measures of motivation (i.e. intention) unless controlled for.

The self-efficacy-as-motivation argument might also explain the diminishing predictive power of attitude on intention, which usually best predicts intention in the food domain, experience when self-efficacy enters the model. That is, if self-efficacy is rather a representation of respondents' intention to consume functional foods, this measurement complexity might inflate the structural weights between self-efficacy and intention and, as well, confound the effects from the other predictors (Rhodes & Courneya, 2004). Our measurement model demonstrated discriminant validity between intention and self-efficacy, which implies that items designed to reflect the two constructs are different.

The negative path coefficient from PCB is similar to a phenomenon that Rhodes and Courneya (2003a, p. 138) ascribed to either “a sign of suppression, an estimation anomaly, or an incorrectly estimated effect in causal sequencing.” A suppression effect occurs when a variable “increases the predictive validity of another variable (or set of variables) by its inclusion in a regression equation” (Conger, 1974, p. 36). Negative beta weights from control-related constructs (difficulty, control) to intention have been observed before (Armitage & Conner, 1999a, 1999b; Povey et al., 2000a). Armitage and Conner (1999b) suggested this phenomenon probably represents a suppressor effect as the correlation between PCB and intention and between PCB and self-efficacy are positive, comparable with Manstead and van Eekelen (1998) and the present study.

Comparison between the basic TPB model and the extended model (which includes descriptive norm, self-efficacy, and hedonic and utilitarian eating values) suggests that the latter is superior in explaining intention to consume functional foods, increasing explained variance from 64.8% to 70.5% ($F^2 = 0.19$; medium- to large-effect size). The observed effect of self-efficacy on intention corresponds with prior research (for a meta-analysis, see Armitage & Conner, 2001). However, no difference in variance explained in consumption frequency was

detected. Consumption frequency was strongest associated with intention, followed by self-efficacy and PCB, respectively.

5.1. Limitations and direction for future research

The current study focused on “eating functional foods regularly” wherein functional foods are perceived as a superordinate concept rather than explicit products (e.g. milk with added vitamin D). Future research would benefit, for the first, from targeting specific functional food products, as consumers are likely to evaluate different combinations of functional ingredients and food products with various levels of favorability (Krutulyte et al., 2011; Siró et al., 2008; Urala & Lähteenmäki, 2004). Secondly, all data were self-reported (which opens up the potential for some challenges, including satisficing respondents and other method biases; Podsakoff, MacKenzie, & Podsakoff, 2012). Applying the common method factor technique as a statistical remedy to test and account for method bias suggests that common method variance did not pose a serious concern, consistent with a recent re-analysis of research in the TPB domain (Schaller, Patil, & Malhotra, 2015). Third, although measures of validity and reliability met the recommended thresholds for satisfactory values, several correlation coefficients between latent constructs were still high. Fourth, the conceptual model employed in the current study could have benefited from incorporating measures of beliefs antecedent to the major constructs (i.e. behavioral beliefs, normative beliefs, control beliefs), as suggested by Fishbein and Ajzen (2010). Beliefs are assumed to provide cognitive and affective foundations for attitudes, subjective norms, and PBC (Ajzen, 2002a), and including measures of beliefs has the advantage of providing a deeper understanding of the underlying determinants shaping consumer attitudes, subjective norms, and perceived behavioral control toward functional food consumption (Patch et al., 2005). Fifth, background factors such as sociodemographic variables (Mogendi et al., 2016; Verbeke, 2005) and personality (Ajzen, 2011; Rhodes, Courneya, & Jones, 2002) have been found to influence TPB constructs and could have been incorporated into the model to further identify individual differences in functional food consumption behavior. Lastly, the retrospective nature of the behavioral construct (i.e. prior consumption frequency) poses a limitation to the model’s predictive power.

6. Conclusions

The current research contributes to the existing literature in that it provides empirical evidence of the ability of an extended TPB to predict or explain intention to consume and prior consumption frequency of functional foods among a representative sample of 810 consumers in Norway. Of particular relevance was the strong predictive power of self-efficacy on intention, which suggests consumers are motivated to consume functional foods to the extent that they perceive themselves as capable of doing so. Furthermore, social pressure to engage in functional food consumption was strongly associated with consumer intention, with both injunctive and descriptive norms equally important to the formation of intentions. Attitude, which is more strongly associated with consumers’ utilitarian as opposed to hedonic eating values, also exerted significant explanatory power on intention. Overall, the extended model increased the explained variance in intention from 64.8% to 70.5% and provided a broader understanding of consumers’ motivation to consume functional food. It is suggested that the food industry could benefit from improving hedonic attributes of functional foods which, in turn, might open it up for targeting new consumer segments by balancing its “functional” focus with hedonic expectations.

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Declaration of Competing Interest

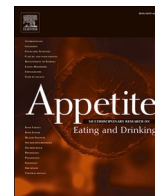
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Individual differences in functional food consumption: The role of time perspective and the Big Five personality traits

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ABSTRACT

Prior research suggests inconsistent relationships between individuals' personality traits, time perspective, and specific behavior. In a large representative sample of Norwegian consumers ($N = 810$), we investigated the relationships between the Big Five personality traits, domain-specific consideration of future consequences (CFC), and consumption of functional foods. Structural equation modeling was employed to test the hypothesized associations. Both CFC-Future and CFC-Immediate were positively related to the consumption of functional foods, whereas personality traits exerted no direct influence on consumption. Several significant associations between personality traits and CFC-Future and CFC-Immediate were found, and three of the five personality traits—Conscientiousness, Agreeableness, and Neuroticism—exerted indirect effects on consumption frequency via CFC-Future. Results support an integrative and hierarchical understanding of how personality traits and time perspective interact in explaining variation in functional food consumption. The findings support the notion that (domain-specific) CFC is better conceptualized as two distinct—albeit related constructs—that are shaped, in part, by broader personality traits.

1. Introduction

Functional foods are food products that have been enriched with health-enhancing or disease-preventing ingredients (e.g., vitamins, minerals) that are part of a standard diet and consumed on a regular basis in normal quantities (Doyon & Labrecque, 2008; Laros & Steenkamp, 2005). Prior investigations into explaining consumer behavior toward functional foods have largely focused on factors such as convenience, health benefits, price, preferences, taste, and other sensory attributes (Siró, Kápolna, Kápolna, & Lugasi, 2008; Urala & Lähteenmäki, 2003). More recently, research efforts have explored factors related to the consumer such as hedonic pleasure, cognition and affect, knowledge, habits, trust, and perceived risk (Bimbo et al., 2017; Mogendi, De Steur, Gellynck, & Makokha, 2016; O'Connor & White, 2010; Santeramo et al., 2018; Verbeke, 2006). Although some recent reviews (Bimbo et al., 2017; Santeramo et al., 2018) have identified various personal values or personality traits to influence consumer acceptance or consumption of functional foods, studies investigating if and how individual differences in broader behavioral dispositions relate to functional food consumption are still scarce.

The current study addresses if and how individual differences in the Big Five personality traits (Donnellan, Oswald, Baird, & Lucas, 2006; John & Srivastava, 1999) and consideration of future consequences (Strathman, Gleicher, Boninger, & Edwards, 1994; van Beek, Antonides, & Handgraaf, 2013) are interrelated and associated with the consumption of functional foods. Consideration of future consequences (hereafter, CFC) assesses the extent that individuals' CFC influences their current behavior, and it is a frequently used measure to explain individual differences in health (e.g., Crockett, Weinman, Hankins, & Marteau, 2009; Murphy & Dockray, 2018) and food-related behaviors (e.g., Dassen, Houben, & Jansen, 2015; Olsen & Tuu, 2017). The five-factor model of personality (FFM; McCrae & Costa, 1997) is one of the most used frameworks to study individual personality traits, including their relationship to (healthy) food behavior (e.g., Goldberg & Strycker, 2002; Keller & Siegrist, 2015). This study investigates the *antecedent role of personality traits* on CFC and consumption of functional foods, and the *mediating role of CFC*. To the authors' knowledge, this is the first study to include the Big Five personality traits as precursors of CFC domain-specific to (healthy) food choice.

Time perspective is suggested to be rooted in positive and negative

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affect (Kooij, Kanfer, Betts, & Rudolph, 2018), personality traits (Kairys & Liniauskaitė, 2015), or agentic traits such as self-esteem or locus of control (Shipp, Edwards, & Lambert, 2009). The current study contributes to the ongoing discussion on domain-specificity (McKay, Perry, Cole, & Magee, 2017; Murphy, Cadogan, & Dockray, 2019) and dimensionality of CFC (Joireman & King, 2016; Murphy & Dockray, 2018) and aims to extend this research area into novel health domains (i. e., functional foods). This study first examined the *dimensionality* of a CFC scale domain-specific to food choice and health outcomes. The study defines CFC as an attitudinal or cognitive-motivational construct of beliefs that is oriented toward domain-specific consequences, suggesting that individuals can be future-orientated in some behavioral domains, but not in others (McKay et al., 2017; Murphy et al., 2019). Time perspective is argued to be more dynamic and domain-specific and thus more easily subjective to change as compared to personality (Kairys & Liniauskaitė, 2015). In a recent review, Kooij et al. (2018) encouraged future research to investigate if and how future time perspective mediates the relationship between personality traits and specific behaviors and outcomes, including health behavior. Although malleable across the lifespan, personality traits tend to endure over time (Cobb-Clark & Schurer, 2012). According to the Five Factor Theory (FFT; McCrae & Costa, 1996), personality traits are distal causes of behavior mediated by characteristic adaptations including (health) habits, beliefs, and attitudes (McCrae & Costa, 2008; McCrae & Sutin, 2018). In adherence to this, individual differences in CFC could help in explaining *why* Conscientiousness is positively related to consumption of less unhealthy food (viz., Bogg & Roberts, 2004) or *why* Openness and consumption of fruits and vegetables are positively associated (viz., Lunn, Nowson, Worsley, & Torres, 2014). Overall, the current study aims to explore possible associations between domain-specific CFC, the Big Five personality traits and the consumption of functional foods.

2. Theoretical framework

Hierarchically, time perspective acts as an overarching temporal construct encompassing various time-related concepts such as time attitude (Nuttin, 2014), temporal focus (Shipp & Aeon, 2019), time orientation (Zimbardo & Boyd, 1999), and CFC (Strathman et al., 1994). The concept of (future) time perspective (hereafter, FTP) has been referred to as both a motivational-cognitive or attitudinal construct, and as a stable disposition similar to personality traits (Kairys & Liniauskaitė, 2015; Kooij et al., 2018). Although FTP certainly shares characteristics similar to traits (i.e., a stable, cross-situational behavioral tendency), it is frequently argued to differentiate the two (Kooij et al., 2018). Kairys and Liniauskaitė (2015) concluded that the nature of time perspective is two-fold: “The core [...] is relatively stable and similar to [traits] and the shell of it is dynamic and subjective to situational changes” (p. 110).

Many current decisions have future implications (Kim & Zauberman, 2019). For instance, individuals’ eating behavior involves consideration of, and conflict in prioritizing between, immediate hedonism in eating pleasure and future goals or consequences for health, longer life expectancy, or well-being (van Beek et al., 2013). Typically, future time perspective is positively associated with engaging in health-promoting behaviors (Hall, Fong, & Sansone, 2015). Consideration of future consequences refers to “the extent to which individuals consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes” (Strathman et al., 1994, p. 743). Thus, consideration of future consequences not only assesses individuals’ future time perspective (i.e., consequences in the future), but also their tendencies for enjoying the present (i.e., maximizing immediate hedonic benefits at the expense of future benefits). The present study consequently considers CFC an attitudinal or cognitive-motivational construct in accordance with commonly held views (Andre, van Vianen, Peetsma, & Oort, 2018; Kairys & Liniauskaitė, 2015; Kooij et al., 2018). Finally, and in accordance with current

research on CFC and health behavior, we posit a bidimensional operationalization; that is, we distinguish between CFC-Future and CFC-Immediate (e.g., J. Adams, 2012; Joireman & King, 2016).

2.1. CFC dimensionality and domain-specificity

A recent meta-analysis (Murphy & Dockray, 2018) has called attention to an ongoing debate regarding the underlying factor structure of CFC. Although most studies to date have treated the CFC scale as unidimensional (Mohammed & Marhefka, 2019), increasing evidence suggests two factors (e.g., Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008; Joireman, Shaffer, Balliet, & Strathman, 2012) or even four factors (e.g., Ryack, 2012; Zhang, Kong, Zhang, & Li, 2015). One rationale for a two-factor structure is that “individuals may consider the future consequences of their actions, the immediate consequences of their actions, or both” (p. 1273). Consequently, we first assessed the dimensionality of CFC; that is, comparing a unidimensional (CFC) with a bidimensional (CFC-Future, CFC-Immediate) factor structure.

Until recently, CFC has predominantly been interpreted as a global domain-free construct (Murphy et al., 2019); that is, CFC is fixed across all life domains. However, several investigators have proposed that CFC is domain-specific (e.g., Dassen et al., 2015; McKay et al., 2017; van Beek et al., 2013) and that domain-specificity may tackle concerns about small effect sizes and inconsistency in research findings (Joireman & King, 2016; Murphy et al., 2019; Sweeney & Culcea, 2017). For instance, Murphy et al. (2019) explicated that “it is possible that an individual can consider future behavioral outcomes in one domain (e.g., work) and relatively immediate outcomes in another (e.g., health)” (p. 2). van Beek et al. (2013) argued that food choices involve trade-offs between immediate outcomes such as pleasure/hedonism and future outcomes related to adverse health or utilitarian effects. In their study, a domain-specific adaptation of the CFC scale was developed to reflect future and immediate consideration of current eating behavior, wherein the words *food* or *eating behavior* were incorporated into the original CFC scale items. In their Dutch sample, healthy eating was only associated with consideration of immediate outcomes, such that immediate-oriented individuals consumed less healthy food. Building upon their study, Dassen et al. (2015) found that consideration of future (vs. immediate) consequences in relation to food consumption in a Dutch sample was strongly associated with healthier (vs. unhealthy) eating patterns. More recently, Rojas-Rivas et al. (2020) found similar domain-specific CFC-Future and CFC-Immediate scales to differentially explain bread choices among Uruguayan consumers; that is, future-oriented consumers chose whole bread (i.e., healthy option) whereas present-oriented people went for the less healthy option—white bread (see also McKay et al., 2017; McKay, Perry, & Cole, 2018).

Combined, these studies suggest that domain-specific measures of CFC are preferable to global measures in predicting specific behaviors. This recognition can be attributed to the notion of compatibility (Ajzen & Fishbein, 2005), which states that “measures of attitude and behavior involve exactly the same target, act, context, and time (TACT) elements, whether defined at a very specific or at a more general level” (p. 29). We argue that consumption of functional foods is a convenient means to achieve or maintain a healthier diet, resonating both a desire for convenience and taste (present orientation) and a desire for healthy eating (future orientation). Our conceptualization of CFC as a domain-specific attitudinal construct would suggest that adhering to the principle of compatibility could strengthen the association between CFC and consumption of functional foods. This study contributes to the existing literature (Dassen et al., 2015; van Beek et al., 2013) in exploring if and how domain-specific CFC is related to functional food consumption:

H1a. CFC-Future is *positively* associated with functional food consumption frequency.

H1b. CFC-Immediate is *positively* associated with functional food consumption frequency.

2.2. The Big Five personality traits and (healthy) food choice

Personality traits are individual characteristics of “relatively stable patterns of behavior, thoughts, and emotions” (Parks-Leduc, Feldman, & Bardi, 2015, p. 3), which are predictive of various general behavioral patterns including health and eating habits (Bogg & Roberts, 2004; Goldberg & Strycker, 2002). The dominant representation of personality is the Five Factor Model (McCrae & Costa, 1997; Roccas, Sagiv, Schwartz, & Knafo, 2002), which represents the Big Five personality traits “at the broadest level of abstraction” (John & Srivastava, 1999, p. 105): Openness to Experience (Openness), Conscientiousness, Extraversion, Agreeableness, and Neuroticism.¹ According to the Five Factor Theory, personality traits, as basic tendencies, are “abstract potentials, hypothetical psychological features of the individual that, over time and in specific situations, come to be manifested in concrete realizations” (McCrae & Sutin, 2018, p. 152). Together, these structural individual differences in personality describe broad behavioral tendencies associated with future behavior and behavioral outcomes (Baumert et al., 2017).

Personality traits constitute reliable predictors of dietary and health behavior patterns (Bogg & Roberts, 2004; Goldberg & Strycker, 2002; Machado-Oliveira et al., 2020; Stevenson, 2017) through traits of Conscientiousness and Neuroticism (Carrillo, Prado-Gascó, Fiszman, & Varela, 2012), self-control (Salmon, Fennis, de Ridder, Adriaanse, & De Vet, 2014), or hedonic tendencies (Hofmann, van Koningsbruggen, Stroebe, Ramanathan, & Aarts, 2010; Lowe & Butryn, 2007). Several studies have also investigated relations between personality traits and individual eating habits, dietary intake, and food choice (Lin, Ortega, Caputo, & Lusk, 2019). A review by Lunn et al. (2014) emphasized “a positive association between Openness and consumption of fruits and vegetables and between Conscientiousness and healthy eating” (p. 403). Openness and Conscientiousness also displayed positive relationships to adhering to a healthy diet in a large U.S. community sample (Goldberg & Strycker, 2002). Furthermore, Bogg and Roberts’ (2004) meta-analysis demonstrated that Conscientiousness was positively associated with the consumption of less unhealthy food, whereas Carrillo et al. (2012) provided evidence of Conscientiousness and Neuroticism affecting the food choice motives health and weight control; and, ultimately, the consumption of low-sugar, low-fat, and high-calorie foods in a Spanish sample of young consumers. Keller and Siegrist (2015) demonstrated that personality influenced food consumption and played “a role in adherence to a balanced or unbalanced diet” in a random sample of the German-speaking part of Switzerland (p. 136). For instance, high Conscientiousness was associated with more frequent consumption of fruit and vegetables, whereas high Neuroticism was related to consumption of energy-dense sweet and savory food. In a large sample of Estonian adults, Möttus et al. (2012) demonstrated that low Neuroticism and high Extraversion, Openness, and Conscientiousness were associated with the consumption of healthier diets (i.e., cereals, fish, fruits, and vegetables). More recently, Pfeiler and Egloff (2020, p. 104607) found that Openness and Conscientiousness were related to healthier eating habits among a large representative sample of Australians.

¹ Briefly, Openness characterizes individuals who are imaginative, curious, and creative (Goldberg, 1992) and describes “the breadth, depth, originality, and complexity of an individual’s mental and experiential life” (John et al., 2008, p. 120). Conscientiousness “facilitates task- and goal-directed behavior” including thinking before acting and delaying gratification (John et al., 2008, p. 120). Conscientious people are organized, dutiful, and responsible (Goldberg, 1992; John & Srivastava, 1999) and “stay healthier, thrive, and live longer” (Friedman & Kern, 2014, p. 731). Extraversion is characterized by people being sociable, enthusiastic, and adventurous (John & Srivastava, 1999) and implies “an energetic approach toward the social and material world” (John et al., 2008, p. 120). Agreeable people are trustful, fair, and altruistic (Goldberg, 1992; John & Srivastava, 1999). Finally, neurotic individuals are insecure, guilt-ridden, and tense (Goldberg, 1992).

We argue that functional foods constitute a relatively novel food category of products particularly characterized by their convenience and health-promoting attributes. In an experimental study exploring people’s impressions of users of functional foods, Saher, Arvola, Lindeman, and Lähteenmäki (2004) found that “[buyers] of functional foods were regarded as more innovative” (p. 79). Openness is associated with innovativeness, such that individuals with a high degree of Openness would be more likely to seek out new situations and products (Olsen, Tudoran, Honkanen, & Verplanken, 2016). Openness is also theoretically related to Extraversion through a common higher-order factor labeled plasticity, rendering extraverted people—like open people—more dispositioned to “seek out stimulating experiences” (Feist, 2019, p. 31). Together, both Openness and Extraversion (i.e., plasticity) involve a general tendency toward exploration of and adaptation to novel phenomena (Feist, 2019; Olsen et al., 2016). Thus, a reasonable expectation would be that both open and extraverted individuals are more prone to consume functional foods compared to less open and introverted consumers.

Low Conscientiousness is associated with detrimental health behaviors such as smoking, substance abuse, and unhealthy dietary and exercise habits (John, Naumann, & Soto, 2008). Among the Big Five personality traits, Conscientiousness is most consistently related to the consumption of healthier diets (Stevenson, 2017). Thus, we expect that conscientious people will be more inclined to consume functional foods following their ability to plan ahead and anticipate the long-term consequences of their actions (Kooij et al., 2018).

Regarding Agreeableness, more agreeable people tend to approach novel foods more so than people low in Agreeableness (Nezlek & Forstell, 2019). Additionally, Agreeableness is associated with healthy dietary behaviors such as limiting one’s intake of sugar and fats and taking vitamins (Booth-Kewley & Vickers, 1994; Booth-Kewley & Vickers, 1994). It is thus reasonable to expect a positive relationship between Agreeableness and consumption of functional foods.

Finally, Neuroticism is associated with emotional, external, and restrained eating (Elfhag & Morey, 2008; Keller & Siegrist, 2015), and neurotic people are less inclined to delay gratification (Olsen et al., 2016). Neuroticism has further been linked to poor quality diets, higher neophobia, and convenience (MacNicol, Murray, & Austin, 2003; Möttus et al., 2013; Tiainen et al., 2013). Neurotic people are also suggested to “adopt counter-regulatory emotional eating and to eat high-energy dense sweet and savory food in particular” (Keller & Siegrist, 2015, p. 136). The following hypotheses are proposed:

H2a. Personality traits (except Neuroticism) are *positively* associated with functional food consumption frequency.

H2b. Neuroticism is *negatively* associated with functional food consumption frequency.

2.3. Relationships between personality traits and future time perspective (FTP)

Time perspective and personality traits are both considered relatively stable individual determinants of behavior (Kairys & Liniauskaitė, 2015). The two concepts may however be differentiated in accordance with the FFT (McCrae & Sutin, 2018), wherein personality traits are distal causes and time perspective a more proximal determinant (i.e., characteristic adaptations) of behavior (see also Loose, Robiou Du Pont, Acier, & El-Baalbaki, 2019). Indeed, in a recent review, Kooij et al. (2018) suggested the Big Five personality traits—particularly Conscientiousness—to be important antecedents of FTP. The authors posited that “more agreeable, open, extraverted, and conscientious individuals [...] score higher on FTP” (p. 876). Dunkel and Weber (2010) found that Conscientiousness and Neuroticism both were strong positive predictors of FTP (as measured by the ZTPI). Some studies have also demonstrated relationships between personality traits and CFC (e.g., J. Adams & Nettle, 2009; Daugherty & Brase, 2010; Gick, 2014; Lafreniere &

Cramer, 2006). Gick (2014) demonstrated that for university students, Conscientiousness was positively associated with CFC and CFC-Future, but negatively related to CFC-Immediate. In a study of U.S. urban citizens (J. Adams & Nettle, 2009), CFC was positively associated with Conscientiousness, Agreeableness, and Openness and negatively related to Neuroticism. With the exception of Neuroticism both Lafreniere and Cramer (2006) and Daugherty and Brase (2010) found positive correlations of Conscientiousness, Openness, and Agreeableness with CFC in Canadian and U.S. undergraduates, respectively. Finally, Thelken and de Jong (2017) showed that Conscientiousness, Agreeableness, and Neuroticism were positively related to CFC-Future; whereas Conscientiousness was positively, and Extraversion negatively related to CFC-Immediate. Consequently, we proposed the following hypotheses:

H3a. Personality traits are *positively* associated with CFC-Future.

H3b. Personality traits are *negatively* associated with CFC-Immediate.

2.4. The mediating role of CFC

Personality traits are “broad-bandwidth” individual differences that offer parsimony at the expense of predictive accuracy (Saucier & Goldberg, 2004). In other words, personality traits can demonstrate predictive abilities pertaining to broad domains of behavior (e.g., health), albeit to a lesser extent predict specific behaviors (e.g., eating functional foods) within a given domain (see e.g., Epstein, 1979). Descriptive approaches to personality (e.g., FFM) are well-suited to assess inter-individual differences in behavior (Baumert et al., 2017), yet have limitations in providing explanations as to why certain traits are associated with specific behaviors. A means to address such a limitation is to introduce mediating mechanisms responsible for the personality–behavior link. Aside from direct associations between personality traits and FTP and health-related behaviors and outcomes, FTP can take on a mediational role in the personality–health relationship (Kooij et al., 2018), asking “why personality traits have their consequential effects” (Hampson, 2012, p. 317).

The mediating role of (future) time perspective, including CFC, within the health domain has received some research attention (e.g., J. Adams, 2009; J. Adams & White, 2009). However, although plausible, the mediating role of time perspective in the personality–behavior relationship has not been widely explored (Loose et al., 2019). Kooij et al. (2018) advocated that FTP “may function as an important link in the relationships between personality traits and individual motivation and behavior” (p. 868). Their meta-analysis provided evidence of indirect effects of personality traits on several health-related outcome variables as mediated by FTP. A review of CFC (Joireman & King, 2016) also called for research “locating CFC within a broader developmental framework” (p. 322). Our theoretical model conceptualized CFC as a mediator between personality traits and behavior (Fig. 1), and we proposed the following hypotheses:

H4a. CFC-Future mediates the relationship between personality traits and consumption frequency.

H4b. CFC-Immediate mediates the relationship between personality traits and consumption frequency.

3. Materials and methods

3.1. Data collection and sample characteristics

In January 2019, a sample of the Norwegian adult population—representative for sex, age, and region—responded to an online survey. The final sample included 810 respondents, randomly selected from a pre-recruited pool of respondents administered by a reputed research agency—YouGov. Respondents were aged 18–74 years, 50.6% were men, 28.4% had 1–3 years of university education, and 26.0% had ≥ 4 years of university education. Respondents

completed an online survey measuring the Big Five personality traits, domain-specific CFC, and consumption frequency of functional foods, along with other measures not part of this study.

3.2. Measures

A functional food was defined as a food product enriched with minerals, vitamins, fatty acids, or proteins for health-enhancement or disease-prevention, part of a standard diet and consumed on a regular basis in normal quantities (Doyon & Labrecque, 2008; Laros & Steenkamp, 2005). Participants were given the definition prior to the assessment of consumption frequency. Consumption of functional foods was assessed on a scale from 1 (*never/seldom*) to 7 (*several times per day*) following the question: “On average during the last 6 months, how often have you consumed functional foods?” Similar measures have been used to assess self-reported consumption frequency of food (Olsen, Scholderer, Brunsø, & Verbeke, 2007), including functional foods (Goetzke, Nitzko, & Spiller, 2014).

Domain-specific CFC was measured by eight items adapted from van Beek et al. (2013), of which four items were designed to reflect consideration of distal health outcomes of current food choices (CFC-Future) and four items more proximal consequences (CFC-Immediate). The adaptation of the original items consisted in stronger emphasis on *food choice* (vs. *eating behavior*) and *health outcomes* (vs. *outcomes*). This framing, particularly the emphasis on health outcomes, is suggested to clarify the interpretational ambiguity related to the original scale of whether respondents “imagine either positive or negative consequences on their health” (Tórtora & Ares, 2018, p. 710). Sample items were “I often choose to eat food with positive health effects in the long term” (CFC-Future) and “I only choose my food to satisfy immediate needs, figuring possible future health problems will take care of themselves” (CFC-Immediate). The eight items were scored on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

The Big Five personality traits were measured with the Mini-International Personality Item Pool (Mini-IPIP; Donnellan et al., 2006), a 20-item short form of Goldberg’s (1999) 50-item IPIP-FFM. The Mini-IPIP is a validated and frequently used instrument, cited more than 1300 times (Perry, Hoerger, Molix, & Duberstein, 2019), wherein each of the five personality traits is assessed by four items. The current study applied a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Negatively worded items were reverse coded prior to further analysis. In addition, sociodemographic variables sex, age group, and education level were included in the structural models as control variables.

3.3. Analytical procedures

The two-stage procedure of Anderson and Gerbing (1988) was followed for confirmatory factor analyses (CFA) and structural equation modeling (SEM) using RStudio (RStudio Team, Version February 1, 2019, 2019) with *lavaan* package version 0.6–5 (Rosseel, 2012). A CFA was performed to investigate the relationships between items and their corresponding latent constructs. Average variance explained (AVE) and maximum shared variance (MSV) were measures of convergent and discriminant validity, respectively, whereas construct reliability (CR) assessed internal consistency in scale items. Satisfactory convergent validity is represented by AVE > 0.5 , discriminant validity by AVE $>$ MSV, and CR by CR > 0.7 (Hair, Black, Babin, & Anderson, 2013).

Moreover, two measurement models were specified and compared to assess the appropriate factor structure of the CFC scale. Sample size-independent model fit indices included root mean square error of approximation (RMSEA < 0.07), comparative fit index (CFI > 0.92), standardized root mean square residual (SRMR < 0.08), and the Tucker-Lewis Index (TLI > 0.92) (Hair et al., 2013). Confounding effects of common method bias were controlled for by applying an unmeasured latent methods factor to the measurement model (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

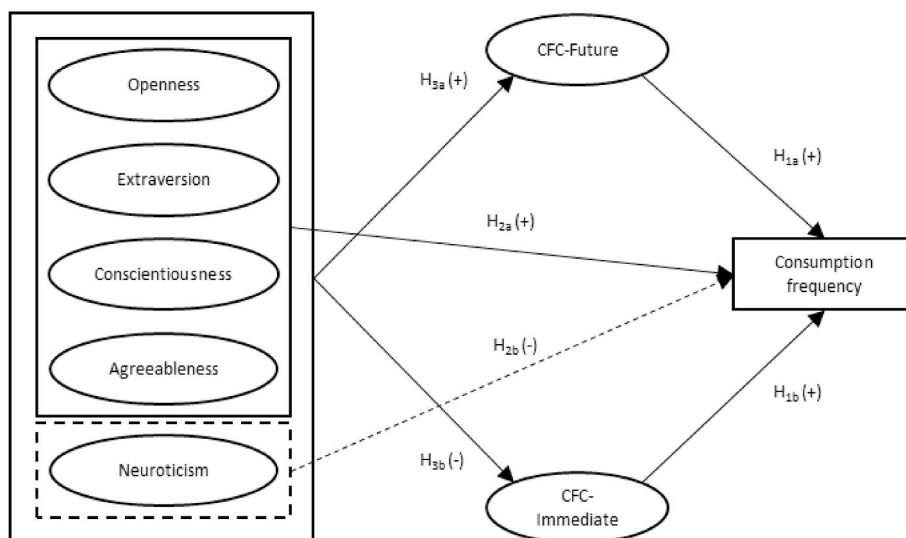


Fig. 1. Conceptual model depicting the hypothesized relationships between the Big Five personality traits, domain-specific CFC, and consumption of functional foods.

CFC: consideration of future consequences.

Finally, a bias-corrected bootstrap procedure with 5000 resamples was run to test for specific indirect effects of personality traits on consumption frequency through CFC-Future and CFC-Immediate, respectively.

4. Results

4.1. Reliability and validity of measures

To assess the appropriate factor structure of the CFC scale, two measurement models were specified, and their model fit were compared. The first model specified CFC as a single unidimensional factor (immediate items reverse-coded). Model fit was poor, $\chi^2(20) = 981.71$, RMSEA = 0.24, CFI = 0.62, SRMR = 0.16, TLI = 0.46. The second model assumed two correlated factors (i.e., CFC-Future vs. CFC-Immediate). Model fit improved significantly, $\chi^2(19) = 107.71$, RMSEA = 0.08, CFI = 0.97, SRMR = 0.04, TLI = 0.95. Hence, a two-factor representation of CFC was retained for further analysis.

The full measurement model included seven latent constructs: CFC-Future, CFC-Immediate, Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Initial model fit was suboptimal, $\chi^2(329) = 2053.65$, RMSEA = 0.08, CFI = 0.79, SRMR = 0.08, TLI = 0.75. To improve overall model fit, the measurement model was screened for problematic items (i.e., low factor loadings and high error correlations). Consequently, one item per latent personality construct was omitted.² The moderated measurement model demonstrated improved fit, $\chi^2(209) = 842.26$, RMSEA = 0.06, CFI = 0.90, SRMR = 0.06, TLI = 0.88. Modification indices suggested some correlated error terms which would improve model fit. However, allowing for correlated error terms—especially between items measuring different latent constructs—is usually not advised without a theoretical reason (Hermida, 2015; Landis, Edwards, & Cortina, 2009) and therefore such modifications were not implemented. CFC-Future and CFC-Immediate demonstrated convergent and discriminant validity, respectively AVE > 0.50 and AVE > MSV, and CR > 0.70. Openness, Conscientiousness, Agreeableness, and Neuroticism were just below the convergent validity

² Structural models were also specified without scale modification (i.e., using the original Mini-IPIP scale in full), which resulted in similar parameter estimates, but severely poorer model fit indices as compared to the model with scale modification.

threshold of 0.50. Conscientiousness and Neuroticism showed inadequate discriminant validity (AVE < MSV) and were just below the construct reliability limit (CR < 0.70). Omitting additional items to achieve better overall model fit, and adequate validity and reliability estimates, was deemed inappropriate on the grounds that the latent constructs then would only be reflected by two items and hence become unidentifiable on their own (e.g., Howell, Breivik, & Wilcox, 2007). Common method bias was not observed. Table 1 presents the final measurement model.

Descriptive results suggest that respondents considered potential future health consequences related to their current food choices (mean CFC-Future = 4.89) more than the immediate rewards (mean CFC-Immediate = 3.54). Consumption of functional foods was positively related to CFC-Future ($r = 0.16$, $p < .001$) but not CFC-Immediate ($r = 0.04$, $p = .29$). Openness ($r = -0.10$, $p < .05$) and Agreeableness ($r = -0.09$, $p < .05$) were negatively correlated with the consumption of functional foods. All five personality traits were intercorrelated ($r = -0.68$ – 0.51 , $p < .001$). Average consumption frequency of functional foods ($M = 2.87$) corresponded to between 1 and 3 times a month and once a week. Table 2 displays correlations and descriptive statistics for study variables.

Compared to men, women were more considerate of future consequences and less of immediate consequences of their food choices. Women also reported higher scores on Extraversion, Agreeableness, and Neuroticism in comparison to men. Age and education level were positively associated with CFC-F and negatively related to CFC-I. Moreover, age and education level were positively related to Openness and Agreeableness and negatively related to Neuroticism. Age was also positively associated with Conscientiousness and Extraversion. A weak negative correlation between age and consumption frequency of functional foods was also observed.

4.2. Tests of structural models and indirect effects

Four structural equation models were specified and tested (Table 3), controlling for sociodemographic variables sex, age group, and education level. Our first research objective was to test the relationships of domain-specific CFC-Future and CFC-Immediate to consumption frequency of functional foods. Model 1 therefore specified CFC-Future and CFC-Immediate as predictors of consumption frequency. Goodness-of-fit measures were adequate, $\chi^2(46) = 160.80$, RMSEA = 0.06, CFI = 0.96,

Table 1
Standardized factor loadings, reliability and validity.

Construct and item	Factor loading	Composite reliability	Average variance extracted
<i>Consideration of future consequences</i>		0.83	0.55
I consider how my health might be in the future, and try to influence my health with my day to day food choices	0.83		
I often choose to eat food with positive health effects in the long term	0.74		
I think it is important to take warnings about negative health consequences of the food I eat seriously even if the consequences will not occur for many years	0.75		
I think it is more important to choose food with favorable distant health consequences than food with less favorable immediate consequences	0.63		
<i>Consideration of immediate consequences</i>		0.83	0.55
I only choose my food to satisfy immediate needs, figuring possible future health problems will take care of itself	0.79		
I generally ignore warnings about possible future health problems in consequence of what I eat because I think they will be resolved before they reach crisis level	0.74		
I think that sacrificing particular food now is usually unnecessary because future health consequences can be dealt with at a later time	0.62		
I only choose food that satisfies my immediate needs, figuring that I will take care of potential future health problems that may occur at a later date	0.80		
<i>Openness</i>		0.73	0.49
open5: I have a vivid imagination	x		
open10: I am not interested in abstract ideas (reverse scored)	0.74		
open15: I have difficulty understanding abstract ideas (reverse scored)	0.82		
open20: I do not have a good imagination (reverse scored)	0.50		
<i>Conscientiousness</i>		0.67	0.42
cons3: I get chores done right away	x		
cons8: I often forget to put things back in their proper place (reverse scored)	0.69		
cons13: I like order	0.41		
cons18: I make a mess of things (reverse scored)	0.79		
<i>Extraversion</i>		0.75	0.50
extr1: I am the life of the party	x		
extr6: I don't talk a lot (reverse scored)	0.78		
extr11: I talk to a lot of different people at parties	0.56		
extr16: I keep in the background (reverse scored)	0.76		
<i>Agreeableness</i>		0.74	0.49
agre2: I sympathize with others' feelings	x		
agre7: I am not interested in other people's problems (reverse scored)	0.71		
agre12: I feel others' emotions	0.57		
	0.79		

Table 1 (continued)

Construct and item	Factor loading	Composite reliability	Average variance extracted
agre17: I am not really interested in others (reverse scored)			
<i>Neuroticism</i>		0.68	0.43
neur4: I have frequent mood swings	0.83		
neur9: I am relaxed most of the time (reverse scored)	x		
neur14: I get upset easily	0.60		
neur19: I seldom feel blue (reverse scored)	0.49		

Note. x indicates omitted items to improve model fit. Model fit: $\chi^2(209) = 842.26$, RMSEA = 0.06, CFI = 0.90, SRMR = 0.06, TLI = 0.88.

SRMR = 0.04, TLI = 0.94. Both CFC-Future ($\beta = 0.22, t = 5.13, p < .001$) and CFC-Immediate ($\beta = 0.12, t = 2.64, p < .01$) were significantly associated with consumption frequency. These results support hypotheses H_{1a} and H_{1b}.

The second objective was to investigate the link between the Big Five personality traits and consumption frequency of functional foods. Thus, Model 2 assessed the direct effects of Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism on consumption frequency. None of the Big Five personality traits were significantly associated with consumption frequency and model fit was unsatisfactory, $\chi^2(121) = 574.06$, RMSEA = 0.07, CFI = 0.88, SRMR = 0.05, TLI = 0.83. Findings were thus unresponsive of hypotheses H_{2a} and H_{2b}.

Introducing the Big Five personality traits as precursors of CFC-Future and CFC-Immediate to the model, two additional analyses were run. The first analysis assumed only indirect effects of personality traits on consumption frequency via CFC-Future and CFC-Immediate, constraining the direct paths to equal zero (Model 3a, full mediation). The second model allowed all paths to be freely estimated (Model 3b, partial mediation). A chi-square difference test comparing the two nested models implied marginally improved model fit, $\Delta\chi^2(5) = 10.85, p = .05$. No change to the other fit indices was observed.

In the full mediation model (Model 3a), both CFC-Future ($\beta = 0.22, t = 5.11, p < .001$) and CFC-Immediate ($\beta = 0.12, t = 2.77, p < .01$) were significant predictors of consumption frequency. The partial mediation model (Model 3b)—allowing for direct effects of personality traits on consumption frequency—attenuated the effect of CFC-Immediate on consumption ($\beta = 0.08, t = 1.73, p = .08$), leaving CFC-Future the only significant predictor of consumption frequency ($\beta = 0.24, t = 5.29, p < .001$). Extraversion was not associated with neither CFC-Future ($\beta = -0.05, t = -0.98, p = .33$) nor CFC-Immediate ($\beta = -0.02, t = -0.37, p = .71$), thus lending no support to hypotheses H_{3a} and H_{3b}. Neuroticism was positively associated with CFC-Future ($\beta = 0.23, t = 2.80, p < .01$) but not CFC-Immediate ($\beta = -0.01, t = -0.17, p = .86$), supporting hypothesis H_{3a} but not hypothesis H_{3b}. Openness was only related to CFC-Immediate ($\beta = -0.18, t = -3.21, p < .01$) and not to CFC-Future ($\beta = 0.09, t = 1.53, p = .13$), supporting hypothesis H_{3b} but not H_{3a}. Conscientiousness ($\beta = 0.25, t = 3.15, p < .01$) and Agreeableness ($\beta = 0.18, t = 2.60, p < .01$) were both positively associated with CFC-Future and negatively related to CFC-Immediate ($\beta = -0.17, t = -2.32, p < .05$; $\beta = -0.14, t = -2.17, p < .05$, respectively), thus supporting hypotheses H_{3a} and H_{3b} (Table 3). The Big Five personality traits explained 15.6% and 20.6% of the variance in CFC-Future and CFC-Immediate, respectively. Together, the Big Five personality traits, CFC-Future, and CFC-Immediate accounted for 6.4% of the variance in consumption

Table 2
Correlation matrix and descriptive statistics for study variables.

	O	C	E	A	N	CFC-F	CFC-I	CF
O	–							
C	0.37***	–						
E	0.25***	0.32***	–					
A	0.51***	0.41***	0.48***	–				
N	–0.36***	–0.68***	–0.41***	–0.34***	–			
CFC-F	0.22***	0.22***	0.08	0.28***	–0.06	–		
CFC-I	–0.35***	–0.32***	–0.21***	–0.35***	0.26***	–0.41***	–	
CF	–0.10*	–0.03	–0.06	–0.09*	0.05	0.16***	0.04	–
Mean	4.60	4.88	4.03	5.18	3.69	4.89	3.54	2.87
SD	1.13	1.14	1.23	1.11	1.20	1.02	1.19	1.66

Note. *** $p < .001$, ** $p < .01$, * $p < .05$, O = Openness, C = Conscientiousness, E = Extraversion, A = Agreeableness, N = Neuroticism, CF = Consumption frequency (of functional food), CFC-F = consideration of future consequences–future, CFC-I = consideration of future consequences–immediate.

Table 3
Structural equation models and fit indices, controlling for sex, age group, and education level.

Relationship	Hypothesis	Model 1		Model 2		Model 3a (Full mediation)		Model 3b (Partial mediation)	
		Std β	t-value	Std β	t-value	Std β	t-value	Std β	t-value
CFC-F → CF	H _{1a}	0.22	5.13***			0.22	5.11***	0.24	5.29***
CFC-I → CF	H _{1b}	0.12	2.64**			0.12	2.77**	0.08	1.73
O → CF	H _{2a}			–0.10	–1.79			–0.10	–1.89
E → CF	H _{2a}			–0.01	–0.20			0.01	0.10
C → CF	H _{2a}			0.07	0.89			0.02	0.26
A → CF	H _{2a}			–0.05	–0.79			–0.09	–1.32
N → CF	H _{2b}			0.02	0.27			–0.03	–0.43
O → CFC-F	H _{3a}					0.08	1.47	0.09	1.53
O → CFC-I	H _{3b}					–0.18	–3.26**	–0.18	–3.21**
E → CFC-F	H _{3a}					–0.05	–0.97	–0.05	–0.98
E → CFC-I	H _{3b}					–0.02	–0.37	–0.02	–0.37
C → CFC-F	H _{3a}					0.25	3.17**	0.25	3.15**
C → CFC-I	H _{3b}					–0.17	–2.32*	–0.17	–2.32*
A → CFC-F	H _{3a}					0.18	2.53*	0.18	2.59**
A → CFC-I	H _{3b}					–0.14	–2.19*	–0.14	–2.17*
N → CFC-F	H _{3a}					0.23	2.79**	0.23	2.80**
N → CFC-I	H _{3b}					–0.01	–0.18	–0.01	–0.17
Model fit indices:									
χ^2 (df)		160.80 (46)		574.06 (121)		976.84 (279)		965.99 (274)	
RMSEA		0.06		0.07		0.06		0.06	
CFI		0.96		0.88		0.89		0.90	
SRMR		0.04		0.05		0.05		0.05	
TLI		0.94		0.83		0.87		0.87	
$\Delta\chi^2$ (Adf)		–		–		–		10.85 (5)	

Note. *** $p < .001$, ** $p < .010$, * $p < .050$. CFC-F = consideration of future consequences–future, CFC-I = consideration of future consequences–immediate, CF = consumption frequency (of functional food), O = Openness, E = Extraversion, C = Conscientiousness, A = Agreeableness, N = Neuroticism.

frequency.³

Results of the bootstrap tests of indirect effects are presented in

³ Some discrepancies between bivariate and structural relationships can be observed. Exploring the effects in a stepwise fashion, we discovered that: (1) CFC-F acts as a suppressor of the relationship between CFC-I and CF since the magnitude of the relationship between the CFC-I and CF ($r = 0.04, p = .29$) becomes larger and highly significant ($\beta = 0.12, p = .01$) when CFC-F is included. This outcome suggests that both the present and future consequences are important in determining consumption frequency and there is a possible synergy between them; and (2) by introducing the personality traits one by one into the model, it was observed that Conscientiousness acts as a suppressor of the bivariate relation between Neuroticism and CFC-F ($r = -0.06, p = .21$ vs. $\beta = 0.23, p < .01$); while the bivariate relationship between Neuroticism and CFC-I ($r = 0.26, p < .001$) dissipates by the introduction of Conscientiousness to the model ($\beta = -0.01, p = .86$), suggesting that Conscientiousness acts as a confounder of the relation between Neuroticism and CFC-I. These are sensible findings claiming that, given a certain level of conscientiousness, neurotic individuals take into consideration the future consequences and no longer emphasize the immediate consequences.

Table 4. No indirect effects of personality traits via CFC-Immediate were found. Contrarywise, three significant indirect effects via CFC-Future were established. Conscientiousness, Agreeableness, and Neuroticism were all associated with higher consumption frequency of functional foods via greater CFC-Future. As no direct effects of personality traits exist, this result suggests indirect-only mediation (Rucker, Preacher, Tormala, & Petty, 2011; Zhao, Lynch, & Chen, 2010).

5. Discussion

The current study examined the simultaneous role of the Big Five personality traits and domain-specific CFC in relation to the consumption of functional foods among a representative sample of Norwegian consumers. Model 1 established a significant association of both CFC-Future and CFC-Immediate with functional food consumption frequency, the former being the stronger predictor. This result is consistent with prior research investigating the links between domain-specific CFC and dietary behavior (e.g., Dassen et al., 2015; van Beek et al., 2013). In Model 2, direct effects of the personality traits on consumption frequency were tested and revealed as nonexistent and non-significant.

Table 4
Bootstrap estimates of the indirect effects.

Predictor	Mediator	B	SE	Z	Beta	BC 95% CI	
						Lower bound	Upper bound
Openness	CFC-Future	0.03	0.03	1.28	0.02	-0.01	0.09
Conscientiousness	CFC-Future	0.09	0.04	2.39*	0.06	0.03	0.19
Extraversion	CFC-Future	-0.02	0.02	-0.81	-0.01	-0.06	0.02
Agreeableness	CFC-Future	0.07	0.03	2.06*	0.04	0.02	0.15
Neuroticism	CFC-Future	0.07	0.03	2.27*	0.06	0.02	0.15
Openness	CFC-Immediate	-0.02	0.02	-1.28	-0.01	-0.07	0.00
Conscientiousness	CFC-Immediate	-0.02	0.02	-1.13	-0.01	-0.07	0.00
Extraversion	CFC-Immediate	0.00	0.01	-0.27	0.00	-0.03	0.01
Agreeableness	CFC-Immediate	-0.02	0.02	-1.17	-0.01	-0.07	0.00
Neuroticism	CFC-Immediate	0.00	0.01	-0.13	0.00	-0.03	0.02

Note. *** $p < .001$, ** $p < .01$, * $p < .05$, B = unstandardized estimate, SE = standard error, Beta = standardized estimate, BC = bias-corrected, CI = confidence interval.

Although hypothesized, this finding was not unexpected owing to the specificity of behavior in question and the conceptual distance between global traits and specific consumption/behavior (Epstein, 1979; Saucier & Goldberg, 2004). The absence of a direct relationship could thus be explained by a lack of compatibility (Ajzen & Fishbein, 2005)—had the behavior in question been broader and more general (e.g., consumption of healthy foods) the hypotheses would more likely have been supported.

Except for Extraversion, the other four personality traits demonstrated significant relationships to either both CFC-Future and CFC-Immediate or one of the two. The direction of relationships was in accordance with expectations. For instance, Conscientiousness was positively associated with CFC-Future and negatively associated with CFC-Immediate, which suggests that the more conscientious individuals are the more considerate they are of future health outcomes related to their food choices. Oppositely, less conscientious individuals are more susceptible to consider the immediate consequences (rewards) of their food choices. Similar patterns of association were evident for Openness and Agreeableness, whereas Neuroticism was only significantly associated with CFC-Future. The pattern of relationships is congruent with some previous investigations of the personality–time perspective relationship (Gick, 2014; Kooij et al., 2018; Thelken & de Jong, 2017). This study confirms the existing literature proposing a conceptual distinction between present and future time perspective (Joireman et al., 2008, 2012). Results further extend previous studies (J. Adams & Nettle, 2009; Daugherty & Brase, 2010; Lafreniere & Cramer, 2006) by providing empirical evidence about the differential antecedent role personality traits exert on future vs. present orientation (i.e., positive vs. negative valence), and thus offer a broader understanding of the associations as compared to a one-dimensional conceptualization.

A comparison between the full and partial mediation models lent support for retaining the latter model following a significant chi-square difference test. The association between CFC-Immediate and consumption frequency was reduced to non-significance when allowing for direct effects of personality traits (i.e., partial mediation). Interpretation of the partial mediation model suggests that personality traits are associated with consumption frequency of functional foods solely through their relationship to CFC-Future.

Indeed, Conscientiousness, Agreeableness, and Neuroticism exerted positive influence on consumption frequency via greater CFC-Future. The mediating role of CFC-Future provides an explanation as to why some personality traits are associated with higher consumption frequency of functional foods. The domain-specific approach to FTP in the present study is interpreted as consideration of future health consequences of present food choices (CFC-Future), which further can be viewed as a conflict or tradeoff between sensorial hedonism (e.g., eating pleasure) in the now and potential (negative) health-related outcomes in the future. Conscientious individuals are characterized by their ability to think before acting and delay gratification (John et al., 2008). Engaging in functional food consumption is argued to constitute a convenient

means to adhere to a healthy diet and is a more likely behavioral consequence to people considerate of and influenced by potential detrimental future health effects related to current food choices.

Agreeableness is related to trustfulness, fairness, and altruism (Goldberg, 1992; John & Srivastava, 1999), and although Murray and Booth (2015) posited that Agreeableness is generally unrelated to health, others have demonstrated associations between the two (e.g., Booth-Kewley & Vickers, 1994; John et al., 2008). The positive relationship between Agreeableness and future time perspective (Kooij et al., 2018) is supported in the current study, which further highlights the important mediating role that CFC-Future plays in explaining the link between Agreeableness and functional food consumption. Similarly—and although higher Neuroticism previously has been linked to less healthy eating (T. B. Adams & Mowen, 2006)—the current results indicated that higher Neuroticism was associated with greater consumption frequency of functional foods as mediated through stronger CFC-Future.

5.1. Limitations and future research

Some limitations need to be addressed. First, the cross-sectional design makes assessment of causality inconclusive (Spector, 2019). The theoretical hierarchical link between the three concepts (i.e., personality traits, time perspective, and behavior) is however well established and the current research provides a process explanation of the relationship (Hampson, 2012; Kooij et al., 2018). Additionally, all data were self-reported and prone to method biases. For example, dietary self-reports are prone to measurement error and pose threats to validity (Subar et al., 2015). Self-reported food frequency measures are, however, commonly applied within social psychology research (e.g., Armitage & Conner, 2001). The construction of a new domain-specific scale to assess CFC poses another potential limitation. Although domain-specific scales better predict relevant outcomes, further development has been suggested forestalled until measurement issues pertaining to the general CFC construct have been sorted (Joireman & King, 2016). Relatedly, competing conceptualizations of and scales to assess time perspective could have been used (e.g., ZTPI, Temporal Focus Scale). Additionally, specification of time frames (e.g., 3 vs. 10 years into the future) has been proposed to improve the precision of time perspective measurements (Mohammed & Marhefka, 2019).

Furthermore, although the Mini-IPIP measure of personality traits is widely applied (Perry et al., 2019), several investigators have noted mixed findings of model fit and low item factor loadings (Baldasaro, Shanahan, & Bauer, 2013; Cooper, Smillie, & Corr, 2010; Laverdière, Morin, & St-Hilaire, 2013; Perry et al., 2019). Typically, RMSEA and SRMR demonstrate reasonable fit whereas CFI and TLI do not—much like in the current study (e.g., Baldasaro et al., 2013; Perry et al., 2019). An unfortunate consequence of modifying scales is that it reduces comparability with similar studies. Model fit “failures” are not however unique to the Mini-IPIP scale—other personality inventories display

similar shortcomings (Hopwood & Donnellan, 2010). Finally, time perspective is only one of many plausible mechanisms potentially relevant to the personality–(health) behavior relationship. Future research would benefit from applying a more comprehensive personality inventory in combination with both a domain-specific CFC and the original CFC or CFC-14 scales (Joireman et al., 2012), and furthermore, include other relevant mediators such as health habits, eating values, or attitudes toward functional foods.

6. Conclusions

The present research responded to the call for integrating FTP as a potential mechanism through which basic personality traits can influence specific behaviors (i.e., consumption of functional foods). Several relations between the Big Five personality traits and CFC and consumption frequency emerged. Although hypothesized—and prior research has demonstrated links between the Big Five personality traits and various health-related behaviors—the conceptual distance between basic traits and specific behaviors is eminent and suggestive of mediating mechanisms accounting for variation in outcome measures. The indirect effects of Conscientiousness, Agreeableness, and Neuroticism on consumption through CFC-Future—and the absence of direct effects—are particularly interesting. The current work has shed some light on FTP as one such potential mechanism and provides initial empirical evidence of an integrative understanding of the personality–behavior relationship.

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Declaration of competing interest

None.

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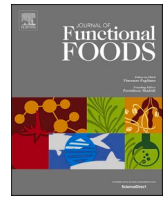
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Relationships between functional food consumption and individual traits and values: A segmentation approach

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ABSTRACT

This study aimed to identify, describe, and compare consumer segments based on food- and health-related values and traits and how the segments are related to functional food consumption. A hybrid hierarchical k-means clustering approach was used to identify homogeneous consumer segments based on food innovativeness, food self-control, hedonic eating values, convenience orientation, health importance, and weight management concern. Based on a representative sample in Norway, three consumer segments were identified: the *careless*, the *self-controlled*, and the *convenience-oriented*. The careless were uninterested in food and health matters and did not appreciate novelty or variation in their food choices. The self-controlled were the most receptive to novelty and food innovation and highly engaged in health matters. The convenience-oriented were the most inclined to consume functional foods, had a pronounced convenience orientation, and were concerned about weight gain. How the industry needs to adapt its marketing strategy across consumer segments are discussed.

1. Introduction

The term functional foods encompasses both natural and industrially processed foods, which “when regularly consumed within a diverse diet at efficacious levels have potentially positive effects on health beyond basic nutrition” (Granato et al., 2020, p. 94). Therefore, functional foods promote optimal health and reduce the risk of noncommunicable diseases (Granato, Nunes, & Barba, 2017). Several recent reviews (Bimbo et al., 2017; Kaur & Singh, 2017; Mogendi, De Steur, Gellynck, & Makokha, 2016; Santeramo et al., 2018; Topolska, Florkiewicz, & Filipiak-Florkiewicz, 2021) attest to health, convenience, and sensory appeal (i.e., taste/flavor) being key motivational attributes or underlying antecedents influencing functional food consumption behavior in addition to psychological or cognitive antecedents, such as attitude, perceptions, and beliefs. In fact, the success of functional food revolves largely around the proper combination of health, convenience, and taste (Gray, Armstrong, & Farley, 2003), as consumers place great importance on eating healthy, saving time and energy, and indulging in pleasurable food consumption (Vorage, Wiseman, Graca, & Harris, 2020). Furthermore, personal values or more stable personality traits also influence consumers’ acceptance or consumption of functional foods (Bimbo et al., 2017; Santeramo et al., 2018).

Research findings are, however, contradictory, and a deeper knowledge about what influences consumption is crucial to successfully drive the development of new products within the functional food category (Alongi & Anese, 2021). According to social cognition models, such as the theory of planned behavior (TPB; Ajzen, 1991) and self-determination theory (SDT; Deci & Ryan, 1985), or the cognitive hierarchy model (Homer & Kahle, 1988), values and traits influence behavioral tendencies indirectly through more proximal beliefs, perceptions, and attitudes in a trait/value–attitude–behavior causal chain (Ajzen, Fishbein, Lohmann, & Albarracín, 2018; Hagger & Chatzisarantis, 2009). Guided by this causal assumption, this study employs a person-centered approach (Howard & Hoffman, 2018) to identify and explore consumer profiles or segments based on theoretically derived personality traits and personal values and to profile the segments by their attitudes, intentions, and consumption of functional food.

Segmentation is an essential part of marketing (Wedel & Kamakura, 2000). An advantage of the person-centered segmentation approach is that it considers the many different combinations of theoretical constructs or variables (e.g., traits and values) that make up an individual, and it tries to understand and describe how subgroups of individuals sharing similar combinations are associated with focal outcome constructs or variables (Howard & Hoffman, 2018). For example,

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personality traits and values can be defined and measured with varying degrees of abstraction, content, and conceptual specification. The relationship between broad or more general personality traits, such as the Big Five (John & Srivastava, 1999; McCrae & Costa, 1997) or universal human values (Bilsky & Schwartz, 1994; Rokeach, 1973), and specific behavior is weak (e.g., Homer & Kahle, 1988; Kassarian, 1971; Lunn, Nowson, Worsley, & Torres, 2014). The large conceptual distance between general personality traits or personal values and a particular behavioral domain, such as functional food consumption, thus calls for research to identify and apply theoretically and empirically relevant traits and values to achieve a more reliable and valid understanding of consumer attitudes and behavioral tendencies toward the consumption of functional food.

Our contributions to the literature are fourfold. First, we extend the existing literature by introducing domain-specific conceptualizations of trait self-control (Tangney, Baumeister, & Boone, 2004) and consumer innovativeness (Goldsmith & Hofacker, 1991) as bases for segmentation. Previous work has identified self-control (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012; Stautz, Zupan, Field, & Marteau, 2018) and domain-specific innovativeness (Araujo, Ladeira, & Santini, 2016; Huotilainen, Pirttilä-Backman, & Tuorila, 2006) as important antecedents to food consumption behavior, but to our knowledge, no study of which we are aware has identified a segment of food-specific self-controllers as suggested in the current research. Second, building upon theories about domain-specific values (Vinson, Scott, & Lamont, 1977), this study extends the previous literature by introducing and combining important antecedents such as convenience orientation (Candel, 2001), hedonic eating value (Babin, Darden, & Griffin, 1994; Voss, Spangenberg, & Grohmann, 2003), and health importance (Steptoe, Pollard, & Wardle, 1995; Tudoran, Olsen, & Dopico, 2009) as bases for segmentation. Findings support the general notion that health and hedonism (or sensory appeal) rank as top priorities in consumers' minds (for a review, see Cunha, Cabral, Moura, & de Almeida, 2018) and provide empirical evidence suggesting that the combination of being convenience oriented, concerned about weight gain, and having a low level of self-control is characteristic of consumers with a higher propensity to consume functional food.

Third, the present study advances a person-centered segmentation approach (Howard & Hoffman, 2018) to identify and explore homogeneous consumer segments by integrating and combining more stable personality traits with more dynamic, context-specific personal values in profiling consumer attitudes toward, intention to consume, and consumption of functional food. Finally, most of the previous segmentation studies regarding functional food include smaller, nonrepresentative samples (e.g., Annunziata & Pascale, 2009; Ares & Gábaro, 2007; van der Zanden, van Kleef, de Wijk, & van Trijp, 2015) or apply factor-clustering techniques (Brečić, Mesić, & Cerjak, 2017; Szakály, Szente, Kövér, Polereczki, & Szigeti, 2012) (for a critical account of factor clustering, see Dolnicar & Grün, 2008). Insufficient sample size and other data-quality issues can influence the validity of segmentation solutions and thereby misguide the practical implications for commercial purposes (Dolnicar & Grün, 2017; Dolnicar, Grün, & Leisch, 2016). The current research employs a nationally representative sample of 810 Norwegian consumers to ascertain valid cluster solutions of appropriate segment sizes and avoids the factor-clustering critique by including all items measuring the theoretical constructs as input in cluster analysis (Dolnicar & Grün, 2008).

To position functional food behaviors in relation to other food behaviors, we also included consumers' consumption of general food categories (e.g., seafood, meat, and chicken) and various specific food categories (e.g., energy drinks, meal replacements, and sweets and snack foods). Functional foods were defined as foods and beverages enriched with minerals, vitamins, fatty acids, or protein for health-promoting or disease-preventing purposes as part of a standard diet and consumed in normal quantities. In the subsequent paragraphs, we introduce individual differences in attitudes and behavioral tendencies toward the

consumption of functional food (Section 1.1) and describe how such constructs have been previously used as segmentation bases to profile groups of functional food consumers (Section 1.2), before presenting theoretically sound arguments for why the inclusion of the specific traits and values used as segmentation bases in the present study is relevant (Sections 1.3–1.5).

1.1. Exploring differences in attitudes, intention, and consumption of functional foods

Traits and values are causally linked to attitudes, intentions, and behavior (Homer & Kahle, 1988; McCrae & Costa, 1995). Whereas traits are descriptions of behavioral patterns, values are “desirable trans-situational goals, varying in importance, that serve as guiding principles in the life of a person ...” (Schwartz, 1994, p. 21). Several consumer studies concerning functional foods explore individual differences in people's attitudes, intentions and/or behavior (see Mogendi et al., 2016; for reviews, see Siró, Kápolna, Kápolna, & Lugasi, 2008). Attitudes represent summary evaluations of psychological objects (Ajzen, 2001). Commonly, attitude is a strong predictor of behavior (Ajzen & Fishbein, 1977) and is associated with behavioral intention to consume a variety of foods (Cook, Kerr, & Moore, 2002; Patch, Tapsell, & Williams, 2005; Verbeke, 2005), including functional foods (Hung, de Kok, & Verbeke, 2016; O'Connor & White, 2010). Intention, in turn, constitutes a motivational force for subsequent behavior (Fishbein & Ajzen, 2010; Sheeran, 2002) that predicts (healthy) eating behavior (Conner, Norman, & Bell, 2002).

Consumer acceptance of functional foods is contingent upon various factors associated with sensory attributes, health claims or benefits, and cognitive, motivational, or attitudinal determinants (Siró et al., 2008). Several studies use the TPB—or factors thereof—to explain or predict attitudes and intention toward, and consumption of functional foods (e.g., Huang, Bai, Zhang, & Gong, 2019; O'Connor & White, 2010). In the context of the present study, attitude refers to the evaluation of *consuming functional foods on a regular basis*, while intention denotes consumers' readiness or motivation to engage in the consumption of functional foods regularly. This study uses a segmentation approach that includes consumers' attitude, intention, and consumption behavior to profile Norwegian consumer segments.

1.2. Segmentation of functional food consumers

Segmentation involves identifying and reducing a heterogeneous market into smaller, homogeneous groups of consumers with similar needs and motives (Smith, 1956; Wedel & Kamakura, 2000). A crucial factor in market segmentation is the choice of characteristics—or segmentation bases—on which to base the analysis (Steenkamp & Ter Hofstede, 2002). Several attempts to segment the functional food market have been made using a multitude of different segmentation bases across diverse populations: Ares and Gábaro (2007) based their segmentation analysis on Uruguayan consumers' food choice motives. Another group of researchers used attitudes, motivation, and knowledge as segmentation bases on a Canadian sample (Herath, Cranfield, & Henson, 2008). Sparke and Menrad (2009) conducted a cross-country segmentation analysis with motives, knowledge, trust in nutrition actors, and purchase patterns as segmentation bases. Annunziata and Pascale (2009) segmented Italian consumers based on their health consciousness, trust in information, and satisfaction. Szakály et al. (2012) applied the FRL approach (Brunso & Grunert, 1995) to segment Hungarian consumers, whereas van der Zanden et al. (2014, 2015) included food-choice motives, product attributes, and benefits sought as bases to segment elderly consumers. Brečić et al. (2017) based their segmentation analysis on a modified version of the FCQ (Steptoe et al., 1995) using a Croatian sample. Roselli et al. (2020) segmented Italian consumers based on product attributes of extra-virgin olive oil with naturally increased polyphenol content. Finally, Karelakis, Zevgitis, Galanopoulos, and

Mattas (2020) performed several cluster analyses of Greek consumers based on their attitudes toward functional foods and interest in following a healthy diet, among other constructs. The current study is positioned within and extends the cited literature by arguing for the inclusion of domain-specific traits and values as relevant and valuable segmentation bases.

1.3. Personality traits and values as segmentation bases

Understanding consumers' underlying consumption motives, values, and goals through psychographic segmentation (i.e., using psychological segmentation bases) adds valuable insights that can be drawn upon for product development, marketing efforts, and behavioral change interventions (Gunter & Furnham, 1992). Several of the previous studies on functional foods cited above integrate traits, values, attitudes, habits, and other motivational or behavioral constructs as bases for segmentation. This study intended to extend the existing literature by integrating and combining stable personality-like traits (e.g., innovativeness and self-control) with more dynamic and context-specific personal values related to food or eating hedonism, health, and convenience—or what people are like vs. what they consider important (Roccas, Sagiv, Schwartz, & Knafo, 2002).

Social psychology theories like the theory of reasoned action (Fishbein & Ajzen, 1975) or the theory of planned behavior (Ajzen, 1991) suggest that traits and values encourage or influence attitudes, intentions, and behavior in a causal chain. However, both personality traits and universal values are relatively stable and transcend specific actions and situations (Kassarjian, 1971; Schwartz & Bilsky, 1987), distinguishing these constructs from attitudes and intentions that usually refer to more specific actions, objects, or situations. Thus, this study does not include attitude, intention, and behavioral constructs as segmentation bases, but rather as profiling variables to discriminate between segments of consumers based on individual differences in traits and values. To achieve stronger trait/value–attitude–consumption relationships (Goldsmith, Freiden, & Eastman, 1995; van Raaij & Verhallen, 1994), we use domain-specific traits (Huotilainen et al., 2006; Stautz et al., 2018; van Trijp & Steenkamp, 1992) and values (Candel, 2001; Lusk & Briggeman, 2009; Steptoe et al., 1995)—previously associated with food choice behavior—as segmentation bases. This study introduces food stimulation and self-control as novel bases for segmentation in combination with more common motives for food consumption (e.g., health importance and hedonism) and functional food consumption (e.g., convenience). In the following, we explain the relevance of including these constructs.

1.4. Domain-specific traits: Food stimulation and self-control

Several constructs have been developed to understand individual differences in people's personalities, values, attitudes, and preferences for stimulation: the Big Five factors of personality include one dimension labeled “openness (to experience)” (John & Srivastava, 1999), whereas Schwartz' theory of basic values includes “stimulation” subsumed in the dimension “openness to change” (Schwartz, 2012). Within the context of consumer behavior (toward food), the global concept of optimum stimulation level (OLS), or specifically the concepts of variety-seeking tendency (VST) and consumer innovativeness (CI) have been frequently used owing to their capability to explain or predict specific consumer behavior (Coward, Fox, & Wilson, 2008; Huotilainen et al., 2006; Kaushik & Rahman, 2014; van Trijp & Steenkamp, 1992). OSL is a stable trait referring to an individual's perceived ideal level of stimulation (Steenkamp & Baumgartner, 1992; van Trijp & Steenkamp, 1992). It is predictive of exploratory tendencies as manifested by “curiosity-motivated behavior, variety seeking, and risk taking” (Steenkamp & Baumgartner, 1992, p. 446), as well as CI (Roehrich, 2004; Steenkamp, Ter Hofstede, & Wedel, 1999).

VST is “the tendency of individuals to seek diversity in their choices

of services or goods” (Kahn, 1995, p. 139). In the area of food, consumers demand variety in their diet for hedonic and utilitarian reasons (Baltas, Kokkinaki, & Loukopoulou, 2017). It has been suggested that individuals with strong VST with respect to foods become bored more quickly and are especially receptive to new products but are less inclined to develop loyalty to specific brands or products (van Trijp & Steenkamp, 1992).

CI is defined as “the predisposition to buy new and different products and brands rather than remain with previous choices and consumption patterns” (Steenkamp et al., 1999, p. 56). Reviews (Bartels & Reinders, 2011; Kaushik & Rahman, 2014) have identified three basic dimensions or levels of CI. Among the levels is domain-specific innovativeness, which “reflects the tendency to learn about and adopt new products within a specific domain of interest” (Bartels & Reinders, 2011, p. 604). Meta-analytic evidence points to associations between domain-specific innovativeness and innovation adoption, attitude, behavioral intentions, and product usage (Araujo et al., 2016). Further, research has demonstrated that domain-specific innovativeness is predictive of willingness to try and use new food products, including functional foods (Huotilainen et al., 2006). Both VST and CI are thus relevant concepts in predicting or explaining consumer behavior with respect to foods (Huotilainen et al., 2006; van Trijp & Steenkamp, 1992). We consider VST and CI to be underlying stable traits for behavioral differences and choice and as an integral part of a domain-specific approach to *food innovativeness*. Functional foods belong to a relatively new and ambiguous food category for consumers (Annunziata & Vecchio, 2011; Scrinis, 2008) and hence, it has been suggested to attract attention from food innovators and variety-seekers.

Self-control is highly relevant for explaining or predicting healthy and unhealthy food consumption (de Ridder et al., 2012; Tangney et al., 2004), with both direct and indirect effects on behavior (Hagger, Hanlon, et al., 2019; McCarthy, Collins, Flaherty, & McCarthy, 2017). The concept of self-control entails “the capacity to alter or override dominant response tendencies and to regulate behavior, thoughts, and emotions” (de Ridder et al., 2012). It has been suggested that self-control is a facet of conscientiousness within the Big Five personality framework (Roberts, Chernyshenko, Stark, & Goldberg, 2005; Tangney et al., 2004) and associated with conformity in Schwartz' theory of basic values (Schwartz, 2012). Studies in food consumption tend to conceptualize self-control as “consumers' choice to refrain from hedonic consumption” (Vosgerau, Scopelliti, & Huh, 2020, p. 181). As such, high levels of self-control would imply utilitarian or healthy consumption whereas low levels of self-control would suggest hedonic consumption, although exceptions exist (e.g., Salmon, Fennis, de Ridder, Adriaanse, & De Vet, 2014). We define self-control as the consumers' ability to control and manage their eating habits (Honkanen, Olsen, Verplanken, & Tuu, 2012; Tangney et al., 2004). Individual differences in self-control are related to health-harming consumption behaviors, including consumption of unhealthy foods (for a review, see Stautz et al., 2018). To the authors' knowledge, the only other study investigating associations between trait self-control and functional food consumption is that of Barauskaite et al. (2018). We use self-control as a segmentation basis owing to its ability to conflict with an individual's exploratory behavior (e.g., variety-seeking; OSL) (e.g., Haws & Redden, 2013), and with hedonism, convenience orientation, and health importance, as discussed below.

1.5. Domain-specific values: Food hedonism, convenience, and health importance

Core values transcend specific actions and situations (Schwartz, 2012). However, the relationship between universal values and domain-specific decision-making or behavior is complicated and mostly weak (Ciecuch, 2017; Krystallis, Vassallo, & Chrysosoidis, 2012). Thus, several studies find that using domain-specific values is more appropriate for understanding whether and how values are related to specific (food) behavior (e.g., Hansen, Sørensen, & Eriksen, 2018). Domain-

specific values are acquired through “experiences in specific situations or domains of activity” (Vinson et al., 1977, p. 45). Hedonism (e.g., regarding taste), convenience, and health are probably the most salient values underlying food choices (e.g., Markovina et al., 2015; Vorage et al., 2020)—including the choice to consume functional foods (e.g., Kraus, 2015; Urala & Lähteenmäki, 2003)—and are therefore considered in this study.

Hedonism or hedonic consumption involves pleasure and emotional arousal (Alba & Williams, 2013; Hirschman & Holbrook, 1982). Consumers are drawn to the pleasurable sensory attributes of foods (Lusk & Briggeman, 2009), and good taste is a particularly important motive behind food choices (Honkanen & Frewer, 2009; Januszewska, Pieniak, & Verbeke, 2011; Markovina et al., 2015), including functional foods (Urala & Lähteenmäki, 2003; Verbeke, 2006). The current study defined hedonic eating value as the importance consumers attach to the sensory aspects of and the pleasure involved in food consumption. It has been suggested that hedonic-oriented consumers are more open to new experiences (Guido, 2006), seek variety (Olsen, Tudoran, Honkanen, & Verplanken, 2016), and have less self-control (Horwath, Hagmann, & Hartmann, 2020; Vosgerau et al., 2020).

Aside from hedonic eating value, consumers are increasingly concerned about convenience—a huge trend in the food industry (Bleiel, 2010). Convenience orientation with respect to food choices and consumption is “the degree to which a consumer is inclined to save time and energy as regards meal preparation” (Candel, 2001, p. 17). Functional foods promote healthy convenience (Dixon, Hinde, & Banwell, 2006) and “can make the desire for healthy eating and the desire for convenience compatible” (Grunert, 2010, p. 168). However, the association between convenience orientation and functional food behavior is inconsistent (Brečić, Gorton, & Barjolle, 2014; Vorage et al., 2020). The present study regarded convenience orientation as representing consumers’ inclination toward saving time and energy in planning, buying, preparing, and consuming foods. Previous studies suggest that convenience orientation is positively associated with hedonism or sensory appeal (Fotopoulos, Krystallis, Vassallo, & Pagiaslis, 2009; Pula, Parks, & Ross, 2014).

The link between diet and health is becoming ever more evident (Domínguez Díaz, Fernández-Ruiz, & Cámara, 2020). Healthfulness is one among several dimensions of food quality and food choices in consumers’ minds (Grunert, 2010; Pollard, Steptoe, & Wardle, 1998; Steptoe et al., 1995). Health-related motives or values are also associated with functional food behavior (Brečić et al., 2014; Pappalardo & Lusk, 2016; Vorage et al., 2020) and health motivation is a significant predictor of willingness to buy functional foods (Hauser, Nussbeck, & Jonas, 2013; Siegrist, Shi, Giusto, & Hartmann, 2015). To capture consumers’ health-related eating values, the current study targeted three dimensions related to health: importance of health, importance of healthy food, and weight management concern. Health importance refers to the extent that individuals value their health in general, whereas healthy food importance represents the importance of eating healthily. Weight management concern is the degree to which food choices are influenced by concerns about increasing body weight. It has been suggested that consumers engaged in health-promoting behaviors, such as healthy eating, exercise higher levels of self-control (de Ridder et al., 2012; Hagger, Gucciardi, et al., 2019; Hankonen, Kinnunen, Absetz, & Jallinoja, 2013). Health importance is also negatively associated with convenience orientation (Hauser et al., 2013).

2. Materials and methods

2.1. Sample and procedure

A large sample (N = 810) of the Norwegian adult population—representative of sex, age, and region—was surveyed in January 2019. Respondents were randomly selected from a pool of pre-recruited members of YouGov, a reputed research agency. Respondents

were aged from 18 to 74, 49% were male, 28% had one to three years of university education, and 26% had four or more years of higher or university education. Participants completed an online survey using computer-assisted web interviewing (CAWI) that measured food-related values and traits, attitudes toward eating functional foods, intentions to consume functional foods, and consumption frequency of various foods. The definition of functional foods as introduced in 1. Introduction was presented to participants at the very beginning of the survey. Examples of common functional foods found in the Norwegian market were also given (e.g., vitamin D-enriched milk and other dairy products). Table 1 provides socio-demographic characteristics of the sample.

2.2. Measures

2.2.1. Segmentation variables

Food innovativeness was measured with a scale composed of seven items adapted from Goldsmith and Hofacker (1991), van Trijp and Steenkamp (1992), and Steenkamp and Baumgartner (1995). The items were “I eat new foods before other people do,” “Compared to my friends, I eat more new foods,” “I think it is fun to try out food items one is not familiar with,” “I prefer to eat food products I am used to,” “I am curious about food products I am not familiar with,” “I like to experience novelty and change in my daily eating routine,” and “I am continually seeking new food ideas and experiences.”

Food self-control was assessed with five items adapted from Honkanen et al. (2012) and Tangney et al. (2004): “I have a hard time breaking bad food habits,” “I wish I had more self-discipline when it comes to what I eat,” “Sometimes I can’t stop myself from eating unhealthy food, even if I know it’s wrong,” “I have trouble with controlling how much I am eating,” and “I resist foods that are bad for my health.”

Hedonic eating value was measured with five items from Olsen and Tuu (2017) adaptation of the items from Babin et al. (1994). Respondents were asked to evaluate the following five items following the stem “It is important to me that the foods I eat...”: “...help me escape from my daily routines,” “...are fun to eat,” “...provide me with good sensory feelings (good taste, smell, appearance, appeal),” “...are enjoyable to eat,” and “...give me exciting feelings when eating.”

Convenience orientation was measured with five items: three items from the convenience sub-scale of Steptoe et al. (1995), one item from Olsen, Scholderer, Brunsø, and Verbeke (2007) modified version of Candel (2001) convenience orientation scale, and one item adapted from Voss et al. (2003). Respondents were asked to evaluate five items following the stem “It is important to me that the foods I eat...” The items were: “...are easy to prepare,” “...take no time to prepare,” “...are easily available in shops and supermarkets,” “...are easy to plan, buy (procure), prepare, and cook,” and “...are effective to eat.”

Health importance was measured with three items adapted from Tudoran et al. (2009) (“It means a lot to me to have a good health,” “Good health is important to me,” and “I often think about my health”). To measure healthy food importance, three items from Tudoran et al.

Table 1
Socio-demographic characteristics (N = 810).

Variables	Per cent	Variables	Per cent
<i>Gender</i>		<i>Highest education level</i>	
Male	49.4	Primary and lower secondary school	7.8
Female	50.6	Upper secondary school	37.8
<i>Age</i>		University or university college (1–3 years)	28.4
Under 30 years	20.0	University or university college (4 years or more)	26.0
30–39 years	21.1	<i>Number of children living at home</i>	
40–49 years	19.0	0	71.9
50–59 years	18.6	1	12.5
Over 60 years	21.2	2 or more	15.7

(2009) and Olsen (2003) were used: “I think of myself as a person who is concerned about healthy food,” “Healthy food is important to me,” and “Eating healthy food means a lot to me.” Finally, two items from Olsen and Tuu (2017) were used to assess weight management concern: “It is important to me that the foods I eat...”: 1) “...help me to control my weight” and 2) “...do not increase my weight.”

All items were scored on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

2.2.2. Profiling variables

Attitude toward the consumption of functional foods was measured with four items reflecting the global dimensions of attitude (Crites, Fabrigar, & Petty, 1994; Fishbein & Ajzen, 2010). Subjects were presented with the stem “Eating functional foods on a regular basis would be...” followed by four pairs of adjectives, which the respondents rated on a 7-point semantic differential scale: “...bad–good,” “...negative–positive,” “...unfavorable–favorable,” and “...dislikable–likable” ($\alpha = 0.937$).

Intention to consume functional foods was measured with five items adopted from Honkanen, Olsen, and Verplanken (2005) and Fishbein and Ajzen (2010): “I intend to eat functional foods on a regular basis,” “I expect to eat functional foods on a regular basis,” “I plan to eat functional foods on a regular basis,” “I will try to eat functional foods on a regular basis,” and “I am willing to eat functional foods on a regular basis” ($\alpha = 0.966$). Subjects rated the items on a scale from 1 (*highly unlikely*) to 7 (*highly likely*).

General consumption habits were measured on a 7-point frequency scale for 16 food categories (e.g., functional foods, fruit and berries, and meat). Respondents were asked the question: “On average during the last 6 months, how often have you consumed the following foods?” Consumption frequencies were assessed on a scale with the following response options: 1 (*never/seldom*); 2 (*1–3 times a month*); 3 (*once a month*); 4 (*2–4 times a week*); 5 (*5–6 times a week*); 6 (*once a day*); and 7 (*several times a day*). Similar measures have been commonly utilized to assess behavior (Dunn, Mohr, Wilson, & Wittert, 2011; Fishbein & Ajzen, 2010; Goetzke, Nitzko, & Spiller, 2014).

Socio-demographic variables—sex, age, education level, region, and number of children living at home—were included for segment profiling. Age was measured on a five-category scale with the following options: 18–29, 30–39, 40–49, 50–59, and 60–74. Education level included four options: elementary school, high school, higher education (1–3 years), and higher education (≥ 4 years). Region (of residence) included five broad subdivisions. Finally, number of children living at home was measured on a six-point scale from 0 (*0 children*) to 5 (*5 or more children*).

2.3. Analytical procedures

A principal component analysis (PCA) with Varimax rotation was first performed using SPSS (Version 26) to determine the underlying structure of the 30 items measuring the constructs (e.g., convenience orientation and hedonic eating values). The Kaiser-Meyer-Olkin (KMO) test and Bartlett’s test of sphericity were used to determine the suitability of a factor analysis. The initial PCA resulted in seven principal components. Inspection of the rotated component matrix suggested that the interpretation of some cross-loadings and components was not straightforward. Hence, the following modifications were made: Three of the seven items measuring food innovativeness were omitted due to their low communality. The item used to capture self-control (“I resist foods that are bad for my health”) was omitted due to its cross-loading. Two items measuring hedonic eating value (“...help me escape from my daily routines” and “...give me exciting feelings when eating”) were discarded due to cross-loading and low factor loading, respectively. The item measuring convenience orientation (“...is easily available in shops and supermarkets”) was omitted owing to cross-loading. Finally, the three items measuring the importance of healthy food were omitted

because they loaded onto the same principal component as the three items measuring health importance. The two items capturing weight management concern loaded onto a separate component.

The final PCA revealed six principal components: food innovativeness, food self-control, hedonic eating value, convenience orientation, health importance, and weight management concern. These explained 78% of the total variance (Table 2). Factor loadings ranged from 0.72 to 0.88 and internal reliability scores exceeded the lower threshold of Cronbach’s α (i.e., 0.70; Hair, Black, Babin, & Anderson, 2014). Considering the criticisms of “factor–cluster segmentation” (e.g., Dolnicar & Grün, 2008), we used the 20 items rather than the six factors as segmentation bases.

A hybrid hierarchical k-means clustering approach using the packages *cluster* (Maechler, Rousseeuw, Struyf, Hubert, & Hornik, 2019) and *factoextra* (Kassambara & Mundt, 2019) in R 3.6.1 (R Core Team, 2019, 2019) was applied. The raw item scores were standardized (scaled) prior to clustering. The procedure first performed hierarchical clustering with Ward’s method (Euclidean distance) to identify cluster centers. Examination of the agglomeration schedule and visual inspection of the dendrogram suggested a two- or three-cluster solution. Next, the identified cluster centers formed the initial cluster centers for k-means clustering. Both the two- and three-cluster solutions were examined, and the three-cluster solution was ultimately retained. To justify this decision, we examined 30 validation indices to determine the most appropriate number of clusters (R package *NbClust*; Charrad,

Table 2
Principal components analysis of segmentation variables.

Construct and item	Factor loading	Cronbach’s α	Variance explained
<i>Food innovativeness</i>		0.90	15.78
I think it is fun to try out food items one is not familiar with	0.87		
I am continually seeking new food ideas and experiences	0.81		
I am curious about food products I am not familiar with	0.86		
I like to experience novelty and change in my daily eating routine	0.85		
<i>Food self-control</i>		0.89	15.27
I have a hard time breaking bad food habits	0.88		
I wish I had more self-discipline when it comes to what I eat	0.86		
Sometimes I can’t stop myself from eating unhealthy food, even if I know it’s wrong	0.85		
I have trouble with controlling how much I am eating	0.83		
<i>Hedonic eating values</i>		0.89	12.60
... are enjoyable to eat	0.85		
... provide me good sensory feelings (good taste, smell, appearance, appeal)	0.82		
... are fun to eat	0.82		
<i>Convenience orientation</i>		0.84	13.80
... take no time to prepare	0.87		
... are easy to prepare	0.87		
... are effective to eat	0.72		
... are easy to plan, buy (provide), prepare, and cook	0.73		
<i>Health importance</i>		0.87	12.03
Good health is important to me	0.84		
It means a lot to me to have good health	0.85		
I often think about my health	0.78		
<i>Weight management concern</i>		0.86	8.59
... help me to control my weight	0.87		
... do not increase my weight	0.85		
Total variance explained			78.07

Note. KMO measure: 0.858; Bartlett’s test of sphericity 9992.49, $df = 190$, $p < .001$. Rotation method: Varimax with Kaiser Normalization.

Ghazzali, Boiteau, & Niknafs, 2014). The majority rule¹ suggested three clusters as the most appropriate solution. A one-way analysis of variance (ANOVA) with Tukey post hoc tests was performed to determine the differences between clusters in terms of the segmentation variables (i.e., values and traits) and profiling variables (i.e., attitude, intention, and consumption). Chi-square tests of independence were run to investigate differences based on the socio-demographic variables.

3. Results

3.1. Consumer segmentation

Health importance and hedonic eating values were the two most important values across segments (i.e., they exhibited the highest overall mean values). For all the segmentation variables, consumers in segment 1 (34.8% of the sample), whom we call the “careless,” exhibited a mean score below the sample mean or near the scale midpoint. They were the least innovative—or most conservative—with respect to foods, with significantly lower scores on variables measuring food innovativeness compared with consumers in the two other segments. The careless consumer was also fairly convenience oriented. The second and smallest segment (24.0% of the sample) presented high levels of food self-control and had the highest scores on the variables measuring food innovativeness. Based on the F-values, we refer to this segment as the “self-controlled.” The third and largest segment (41.2% of the sample) was characterized by a strong convenience orientation and weight management concern. Additionally, this segment exhibited particularly low levels of self-control about food. Segment 3 is referred to as the “convenience-oriented.” The levels of (the trait) self-control regarding food were the clearest difference between the self-controlled (high levels) and the convenience-oriented (low levels). Food innovativeness (a trait) best distinguishes between the careless and the self-controlled. The levels of hedonic eating values discriminated the most between the convenience-oriented (high levels) and the careless (low levels). Table 3 reports the mean differences between segments obtained from the one-way ANOVA with Tukey post hoc tests.

3.2. Profiling based on consumer attitudes toward, intention to consume, and consumption of functional foods

A one-way ANOVA with Tukey post hoc test was also performed to determine differences in consumers' attitudes, intention to consume, and consumption of functional foods across segments (Table 4). Significant differences were observed both for attitudes toward the consumption of functional foods ($F(2,807) = 25.90, p < .001$), intention to consume functional foods ($F(2,807) = 20.72, p < .001$), and consumption of such foods ($F(2,807) = 6.36, p = .002$). The convenience-oriented consumers exhibited a significantly stronger positive attitude toward the consumption of functional foods ($M = 5.23, SD = 1.32$) compared with the careless ($M = 4.50, SD = 1.23$) and the self-controlled ($M = 4.59, SD = 1.61$). The convenience-oriented consumers also presented a stronger intention to consume functional foods ($M = 4.53, SD = 1.43$) compared with the self-controlled ($M = 3.92, SD = 1.85$) and the careless ($M = 3.80, SD = 1.26$). Consumers in the latter two segments did not differ in their attitude toward and intention to consume functional foods. Finally, the convenience-oriented consumers also reported the highest consumption frequency of functional foods ($M = 3.11, SD = 1.65$). These

¹ Numerous validity indices for determining the optimal number of clusters exist and no single index is superior. Examining several indices simultaneously (e.g., 30 indices as in the current analysis) has the advantage of providing a stronger basis for deciding the optimal number of clusters. The optimal number of clusters to retain according to the majority rule is the cluster solution that the majority of the indices suggest (for a comprehensive account, see Arbelaiz, Gurrutxaga, Muguerza, Pérez, & Perona, 2013; Charrad et al., 2014).

Table 3
Differences in segmentation variables across segments.

Construct and items	Careless	Self-controlled	Convenience-oriented	F	Sig.
<i>Food innovativeness</i>					
I think it is fun to try out food items one is not familiar with	3.87 ^c	5.84 ^a	5.20 ^b	155.44	<0.001
I am continually seeking new food ideas and experiences	3.57 ^c	5.10 ^a	4.52 ^b	72.55	<0.001
I am curious about food products I am not familiar with	3.78 ^c	5.77 ^a	5.15 ^b	159.33	<0.001
I like to experience novelty and change in my daily eating routine	3.82 ^c	5.42 ^a	4.91 ^b	117.13	<0.001
<i>Food self-control (reverse-scored)</i>					
I have a hard time breaking bad food habits	4.01 ^b	5.36 ^a	2.93 ^c	239.36	<0.001
I wish I had more self-discipline when it comes to what I eat	4.00 ^b	4.97 ^a	2.52 ^c	229.97	<0.001
Sometimes I can't stop myself from eating unhealthy food, even if I know it's wrong	4.01 ^b	4.97 ^a	2.53 ^c	230.57	<0.001
I have trouble with controlling how much I am eating	4.30 ^b	5.70 ^a	3.43 ^c	154.03	<0.001
<i>Hedonic eating values</i>					
...are enjoyable to eat	4.45 ^b	6.11 ^a	6.04 ^a	261.30	<0.001
...provide me good sensory feelings (good taste, smell, appearance, appeal)	4.28 ^b	5.93 ^a	5.87 ^a	242.68	<0.001
...are fun to eat	4.41 ^b	6.20 ^a	6.07 ^a	305.41	<0.001
<i>Convenience orientation</i>					
...take no time to prepare	4.49 ^b	3.81 ^c	5.40 ^a	107.83	<0.001
...are easy to prepare	4.59 ^b	4.55 ^b	5.78 ^a	108.69	<0.001
...are effective to eat	4.48 ^b	4.18 ^c	5.48 ^a	93.75	<0.001
...are easy to plan, buy (provide), prepare, and cook	4.51 ^c	5.19 ^b	5.94 ^a	122.01	<0.001
<i>Health importance</i>					
Good health is important to me	4.70 ^c	6.40 ^a	6.11 ^b	223.35	<0.001
	4.68 ^c	6.37 ^a	6.06 ^b	193.51	<0.001

(continued on next page)

Table 3 (continued)

Construct and items	Careless	Self-controlled	Convenience-oriented	F	Sig.
It means a lot to me to have good health					
I often think about my health	4.27 ^b	5.71 ^a	5.69 ^a	132.80	<0.001
<i>Weight management concern</i>					
...help me to control my weight	4.10 ^c	4.91 ^b	5.64 ^a	117.37	<0.001
...do not increase my weight	4.19 ^c	5.07 ^b	5.72 ^a	121.70	<0.001
N (%)	282 (34.8)	194 (24.0)	334 (41.2)		

Note: Different superscripts (^{a-c}) indicate significant differences in means between segments found by the Tukey post hoc tests. Italics indicate segment mean < total mean. N = 810.

results suggest that convenience-oriented consumers are more positive toward and more prone to consume functional foods.

3.3. Profiling based on food consumption habits

In addition to the consumption of functional foods, we collected data on the consumption of 15 different food items or categories. A one-way ANOVA with Tukey post hoc tests was performed to identify differences in food consumption habits between consumers in the different segments. The segments differed significantly in the consumption of most foods, including vegetables, fruit and berries, sweets and snack foods, and ready-made foods (Table 5). The self-controlled consumed vegetables and fruits and berries the most frequently—and sweets and snack foods and ready-made foods the least frequently—compared with the other two segments. The convenience-oriented consumers reported the highest consumption frequency of meat as a basis for dinner and of sweets and snack foods. Among the consumers in the three segments, the careless consumed vegetables the least frequently and energy and vitamin drinks the most frequently.

3.4. Socio-demographic characteristics

The socio-demographic variables included age, sex, education level, region, and number of children living at home. The careless segment consists of 282 consumers—mostly men (61.7%). Most careless consumers have a lower education level (51.2%). All age groups are equally represented, with 50–59-year-olds slightly underrepresented (15.6%).

Table 4
Profiling consumer segments based on functional food behavior.

Construct and items	Careless	Self-controlled	Convenience-oriented	F	Sig.
<i>Attitude</i>					
Bad–Good	4.50 ^b	4.57 ^b	5.25 ^a	22.14	<0.001
Negative–Positive	4.53 ^b	4.60 ^b	5.26 ^a	20.73	<0.001
Unfavorable–Favorable	4.54 ^b	4.74 ^b	5.27 ^a	21.30	<0.001
Dislikable–Likable	4.42 ^b	4.44 ^b	5.16 ^a	22.78	<0.001
<i>Intention</i>					
I intend ...	3.82 ^b	3.86 ^b	4.48 ^a	15.74	<0.001
I expect ...	3.78 ^b	3.90 ^b	4.41 ^a	13.99	<0.001
I plan ...	3.67 ^b	3.74 ^b	4.38 ^a	17.31	<0.001
I will try ...	3.78 ^b	3.94 ^b	4.56 ^a	20.99	<0.001
I am willing ...	3.97 ^b	4.19 ^b	4.81 ^a	24.23	<0.001
Consumption	2.73 ^b	2.65 ^b	3.11 ^a	6.36	0.002
N (%)	282 (34.8)	194 (24.0)	334 (41.2)		

Note: Different superscripts (^{a-c}) indicate significant differences in means between segments found by the Tukey post hoc tests. Italics indicate segment mean < total mean. N = 810.

The convenience-oriented segment comprises 334 consumers. The convenience-oriented consumer is typically a woman (59.0%) with higher education (54.2%). Like the careless segment, the age distribution is almost normal but with slightly fewer consumers in the 50–59 age group (16.8%). The self-controlled segment consists of 194 consumers, with women slightly overrepresented (54.1%). Most consumers are older (53.6% are aged 50–74) with higher education (62.9%). No significant differences between segments were observed on the socio-demographic variables region and number of children living at home. Table 6 reports the results of chi-square tests of independence for age, sex, and education level among segments.

4. Discussion

The current study contributes to the functional food consumer literature by showing how domain-specific trait self-control and food innovativeness effectively discriminate between consumer segments, adding to the understanding of what characterizes the functional food consumer. The mixture of food-related traits and values as bases for segmentation proves useful in explaining and describing differences in consumer attitudes, intention, and consumption: the combination of being convenience oriented, concerned about gaining weight from what you eat, and having a low level of self-control is characteristic of consumers more inclined to evaluate the consumption of functional food favorably.

This study identifies three consumer segments—the convenience-oriented (41.2%), the self-controlled (24.0%), and the careless (34.8%)—which both confirms and adds to previous research. For instance, the results confirm the presence of a careless segment (sometimes referred to as uninterested, uninvolved, indifferent, or unmotivated) (Brečić et al., 2017; Sparke & Menrad, 2009; Szakály et al., 2012). Similarly, the results suggest that convenience orientation plays an important part in functional food consumption; thus, the identification of a convenience-oriented segment was not unexpected. Although health and hedonism usually are top priorities in food choices (Cunha et al., 2018) and highlighted by consumers across segments in this study, food self-control best distinguishes the self-controlled and the convenience-oriented consumer. Level of food self-control is further manifested in different consumption patterns, suggesting that a lack of food self-control leads consumers to indulge in the consumption of less healthy foods. Although the self-controlled consumer eats naturally healthy foods (e.g., vegetables, fruits, and berries) more often and unhealthy foods (e.g., sweets, snack foods, and ready-made foods) less often, the convenience-oriented consumer has the most favorable attitudes and is most positive about consuming functional foods. Thus, the convenience-oriented consumer may compensate for their lower consumption of naturally healthy foods by consuming more functional foods—a

Table 5
Profiling consumer segments based on food consumption habits.

Food item	Careless	Self-controlled	Convenience-oriented	F	Sig.
Vegetables	4.49 ^c	5.61 ^a	5.05 ^b	44.79	<0.001
Fruit and berries	4.07 ^b	4.74 ^a	4.36 ^b	10.04	<0.001
Juice	3.12	3.17	2.96	1.13	0.324
Butter and margarine	4.37	4.65	4.57	1.57	0.208
Cereal products	4.63 ^b	5.15 ^a	5.10 ^a	7.48	0.001
Seafood (for dinner)	3.24	3.44	3.40	2.09	0.124
Meat (for dinner)	3.76 ^b	3.75 ^b	3.99 ^a	4.28	0.014
Chicken (for dinner)	3.04 ^{ab}	2.87 ^b	3.16 ^a	4.14	0.016
Sweets and snack foods	3.45 ^b	2.97 ^c	3.76 ^a	21.68	<0.001
Dairy	4.49 ^b	5.05 ^a	4.90 ^a	8.32	<0.001
Yoghurt	3.04 ^{ab}	2.89 ^b	3.28 ^a	4.03	0.018
Pasta	2.93 ^a	2.61 ^b	3.01 ^a	7.92	<0.001
Meal replacement	2.22 ^a	1.67 ^b	2.12 ^a	9.30	<0.001
Energy/vitamin drinks	2.24 ^a	1.41 ^c	1.88 ^b	20.03	<0.001
Ready-made foods	2.74 ^a	2.01 ^b	2.74 ^a	26.17	<0.001
N (%)	282 (34.8)	194 (24.0)	334 (41.2)		

Note: Different superscripts (a–c) indicate significant differences in means between segments found by the Tukey post hoc tests. Italics indicate segment mean < total mean. N = 810.

convenient means to eat healthily. Another potential explanation could be similar to that of Barauskaite et al. (2018), namely that self-controlled consumers evaluate functional food as less distinctive and unique, which subsequently influences their consumption behavior.

Furthermore, food innovativeness—or more precisely a lack thereof—is a significant part of the careless consumer's profile. Similar to Szakály et al. (2012), the careless consumer in the present study resembles the uninvolved consumer: exhibiting little demand for novelties and being conservative in their food choices. Their low levels of food innovativeness may thus help to explain why the careless consumer is more reluctant to eat functional foods. Overall, the roles of food innovativeness and self-control add nuance to the existing literature in the domain of functional food behavior and represent two traits imperative to understanding consumers' food choices. Our person-centered approach also contributes by shedding light on the intraindividual combinations of values and traits and how different consumer profiles

Table 6
Socio-demographic profile of the segments (%).

Variable	Level	Careless	Self-controlled	Convenience-oriented	χ^2	Sig.
Age	18–29	22.0	11.9	23.1	23.77	0.003
	30–39	21.3	18.6	22.5		
	40–49	21.3	16.0	18.9		
	50–59	15.6	26.3	16.8		
	60–74	19.9	27.3	18.9		
Sex	Female	38.3	54.1	59.0	27.43	<0.001
	Male	61.7	45.9	41.0		
Education*	Elementary school	9.0	7.9	6.7	11.26	0.081
	High school	42.3	29.1	39.0		
	Higher education (1–3 years)	26.9	31.7	27.7		
	Higher education (≥ 4 years)	21.9	31.2	26.5		
N (%)		282 (34.8)	194 (24.0)	334 (41.2)		

Note: Results of crosstabulation and chi-square tests of independence. N = 810. *There were missing data for 14 respondents.

relate to functional food behavior and food consumption habits.

Members of the convenience-oriented segment are not only characterized by the fact that they are concerned with saving time and energy in planning, buying, preparing, and consuming foods, but their food choices are also affected by a marked concern about increasing body weight, and their ability to control and manage their eating habits is poor. We believe that this intraindividual combination of low self-control, pronounced weight management concern, and convenience orientation is paramount to understanding their consumption behavior. The convenience-oriented consumer has the most positive attitudes toward eating functional foods, the strongest intentions to consume such foods, as well as the highest consumption frequency of this type of food. It is worth noting that this segment also outnumbers the other two segments and thus represents not only a niche market but potentially a market of significant size that functional food producers can target. The typical convenience-oriented consumers are women of all ages who find it difficult to abandon bad food habits. This agrees with the results of previous studies that have repeatedly reported that women are the main target of functional foods owing to their being more reflective about food and health issues compared with men (Siró et al., 2008). For example, in the study conducted by Karelakis et al. (2020), well-educated women in the middle-to-high income category had more positive perceptions of, and more often consumed, functional food. Furthermore, the convenience-oriented consumer exhibits low levels of self-control and is highly concerned about weight management. Previous studies have demonstrated that weight-concerned people—and women in particular—generally find it difficult to control their food intake (van der Laan, de Ridder, Charbonnier, Viergever, & Smeets, 2014) and that self-control is predictive of weight loss success (Will Crescioni et al., 2011). van der Laan et al. (2014) found that weight-concerned women primarily based their food choices on taste considerations rather than on energy content, which suggests that “self-reports of weight-concerns and restraint are reflective of intentions and wishes to restrict intake, rather than of actual eating behavior” (p. 7). Thus, convenience-oriented consumers' (i.e., mostly women) lack of self-control, combined with a pronounced concern for weight management, may explain their higher consumption frequency of sweets, snack foods, and ready-made foods compared to self-controlled consumers. This is similar to Sparke and Menrad (2009), who identified a segment named the *enthusiastic beauty-oriented*. These consumers often purchased functional foods and were particularly motivated for beauty reasons as opposed to health per se. Hence, the marked concern for weight gain among convenience-oriented consumers can be attributed to concerns about appearance or vanity rather than a desire to lead a healthy life. Their lack of food self-control entails both an admission of having difficulty in abandoning bad food habits and at the same time a desire to improve their self-discipline when choosing what to eat. Hence, the convenience-oriented consumer's lack of food self-control is not solely

an unconscious trait but rather something of which they are fully aware and would like to change.

The self-controlled consumer fits the description of “the typical functional food consumer” (i.e., being female, well-educated/higher income class, and being older than 55 years) (Siró et al., 2008). In contrast to convenience-oriented consumers, self-controlled consumers are not as concerned about weight management but emphasize the importance of health somewhat more. Their high level of food self-control, coupled with their emphasis on health importance, may therefore explain their higher consumption frequency of naturally healthy foods, such as fruit, berries, and vegetables, and their modest consumption of functional foods, ready-made foods, sweets, and snack foods. Although self-controlled consumers actively seek new food ideas and find pleasure in new food experiences—a trait previously associated with proneness to consuming functional foods (cf., Huotilainen et al., 2006)—their weaker convenience orientation may explain why they do not consider functional foods more favorable (Brečić et al., 2017). Compared to the results of some previous studies using the FRL (e.g., Buckley, Cowan, McCarthy, & O’Sullivan, 2005; Szakály et al., 2012), in the present study, the self-controlled consumer has similarities with both the rational and the adventurous consumer, such as elevated responsiveness to novelty and attraction toward new food products, as well as an emphasis on health.

The careless consumers comprise mostly men and are characterized by a reluctance or incuriosity toward new food experiences. The majority of the careless have a lower level of education (elementary school and high school) and appear to be uninvolved or uninterested in both food and health. Similar characteristics of the careless found in the present study fit the description of the careless/uninvolved/indifferent/conservative consumers proposed by other studies, with their hallmark being low scores on all the variables and a pronounced reluctance toward novelty (Brečić et al., 2017; Buckley et al., 2005; Szakály et al., 2012). The careless consumer has a significantly lower consumption of vegetables and a higher consumption of energy and vitamin drinks compared to the convenience-oriented and the self-controlled consumers.

Our results provide new insights into the underlying motives and goals of consumers susceptible to consuming functional foods and the intraindividual combinations of values and traits that distinguish the different consumer segments. The identification and characteristics of the self-controlled consumer segment is a significant contribution of this study. Both the convenience-oriented and the self-controlled consumer are equally motivated by hedonism, but where the latter has high levels of self-control, the former has low levels of this trait. Level of self-control thus appears to be instrumental in differentiating between consumers who are high vs. low in their consumption of functional food. Convenience plays a significant role in functional food consumers’ decision-making. The combination of health benefits and convenience is a hallmark of functional foods that is proposed to be both the main prerequisite for functional foods as well as consumers’ underlying motive for consuming them. Controversially, the segment most positive toward functional foods—motivated by weight management concern in particular—is also the one that consumes sweets and snack foods the most. This inconsistency may be due to low levels of self-control regarding food. Although the convenience-oriented consumer is quite engaged with health-related issues, their poor ability to exercise self-control poses a threat when deciding which food to choose, and they thus may fall prey more easily to the temptation that hedonism represents and opt for less healthy alternatives more often (e.g., sweets and snack foods). The stronger weight management concern of the convenience-oriented consumer can possibly be attributed to an underlying motivation to achieve or maintain a desired appearance and may not necessarily reflect a general health motive. However, this potential explanation requires further research attention.

The choices of individual domain-specific traits and values included in this study are both theoretically grounded in the personality and

social psychology literature (McCrae & Costa, 1995; Rokeach, 1973; Schwartz, 2012) and are operationally robust in the assessment of constructs (e.g., Tangney et al., 2004). Other strengths of this study pertain to the use of a nationally representative sample, unlike several other segmentation studies (e.g., Annunziata & Pascale, 2009; Ares & Gámbaro, 2007; van der Zanden et al., 2015), and to the use of an “item-clustering” rather than a “factor-clustering” technique (Dolnicar & Grün, 2008). With a large sample size, we expect that our study will yield more valid and reliable results, reinforcing the practical implications for functional food producers and marketers. For example, the resulting segment sizes can more reliably come to represent “true” shares of consumers within the different segments.

5. Limitations

This study focused on functional foods as a food category. Consumer acceptance of or consumption behavior related to functional foods is not unconditional but varies according to the perceived fit between the carrier and ingredients (e.g., Krutulyte et al., 2011; Lu, 2015) or the exact product under scrutiny (e.g., de Jong, Ocke, Branderhorst, & Friele, 2003), among other factors. Thus, future studies may benefit from including specific functional food products and examining the extent to which consumer segments are stable—for example, will the convenience-oriented consumer still be most inclined to consume functional foods regardless of the product in question? Additionally, this study was conducted in a single country (Norway). Since food consumption patterns (Gracia & Albisu, 2001) and food choice motives (Prescott, Young, O’Neill, Yau, & Stevens, 2002; Sparke & Menrad, 2009) tend to vary between countries, future research should include consumers from several countries to validate these findings. Furthermore, we have argued for the inclusion and appropriateness of domain-specific traits and values as segmentation bases. Considering how important the choice of segmentation bases is, the inclusion of other variables can prove useful. Relevant candidates include the importance of food safety and food naturalness, (the credibility of) health claims, knowledge about functional foods, and social norms due to their association with consumer acceptance of a product (Siró et al., 2008). In contrast to domain-specific bases, segmentation based on broader personality traits (e.g., Big Five; John & Srivastava, 1999; McCrae & Costa, 1997) and personal values (e.g., universal human values; Bilsky & Schwartz, 1994; Rokeach, 1973) can also be assessed to gain insight into their interrelationships and ability to identify and differentiate between different groups of consumers. Finally, future studies could consider other theoretical perspectives such as SDT, which also includes perceptions of control by internal and external forces related to the self or self-image (Bimbo, Bonanno, Van Trijp, & Viscecchia, 2018; Hagger & Chatzisarantis, 2009; Hartmann, Dohle, & Siegrist, 2015).

6. Conclusions

This study has demonstrated how food-related values and traits can successfully distinguish among homogeneous groups of consumers. The person-centered approach has made it possible to uncover and describe how the Norwegian consumer profiles differ from each other in terms of consumption habits, attitudes, and behavioral intentions toward eating functional foods, as well as socio-demographics. These insights should be of great importance to functional food marketers, who can tailor their marketing strategy to match the various consumer profiles. Learning more about what characterizes the consumer of functional foods is a prerequisite for product development and effective marketing efforts (Alongi & Anese, 2021). Worth noting is that the segment most inclined to consume functional foods also had a pronounced concern about weight gain and was overtly convenience oriented. In fact, consumption of functional foods is closely linked to attributes such as convenience and health, and the results of this study therefore suggest that functional foods meet the expectations of the convenience-oriented consumer quite

well.

Ethical statement

We wish to confirm that the study was conducted in accordance with the Norwegian National Research Ethics Committees' *Guidelines for Research Ethics in the Social Sciences, Humanities, Law and Theology*. All data were collected by YouGov (data processor) from members of its consumer panel. Upon becoming a member of YouGov's consumer panel participants give their informed consent in accordance with YouGov's privacy statement. Participation was voluntary and respondents could withdraw from participation at any given moment. No personal data were collected as part of the survey, and hence the authors have no means of identifying the respondents.

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CRediT authorship contribution statement

Bjørn Tore Nystrand: Conceptualization, Methodology, Formal analysis, Writing – original draft, Project administration, Funding acquisition. **Svein Ottar Olsen:** Conceptualization, Writing – original draft, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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