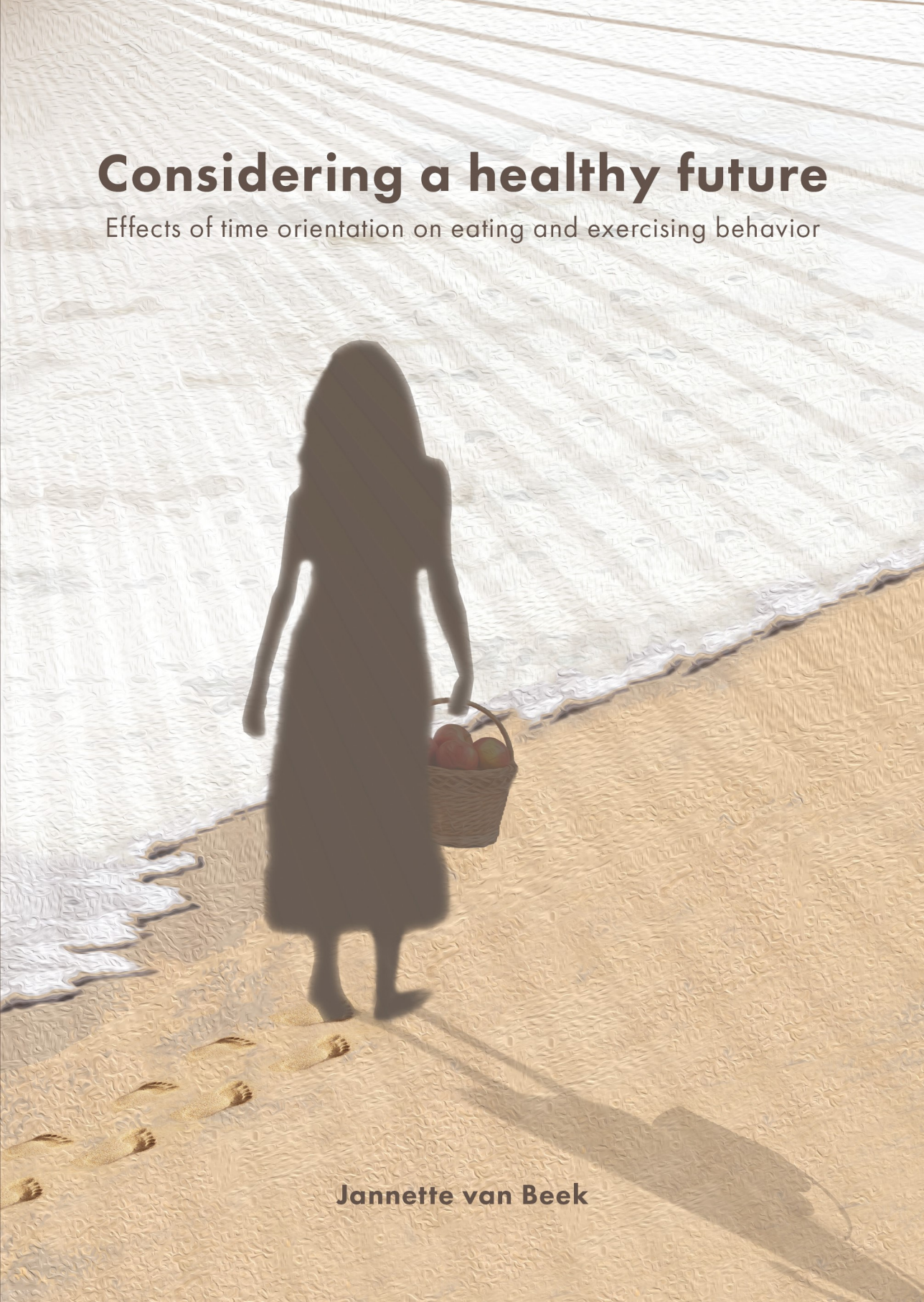
Considering a healthy future

Effects of time orientation on eating and exercising behavior



Jannette van Beek

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This research was conducted under the auspices of the Wageningen School of Social Sciences (WASS).

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Jannette van Beek

Thesis
submitted in fulfilment of the requirements for the degree of doctor
at Wageningen University
by the authority of the Rector Magnificus,
Prof. Dr A.P.J. Mol,
in the presence of the
Thesis Committee appointed by the Academic Board
to be defended in public
on Tuesday 18 October 2016
at 1:30 p.m. in the Aula.

Jannette van Beek
Considering a healthy future: Effects of time orientation
on eating and exercising behavior
168 pages.

PhD thesis, Wageningen University, Wageningen, NL (2016)
With references, with summaries in English and Dutch

ISBN: 978-94-6257-928-6
DOI: 10.18174/390027

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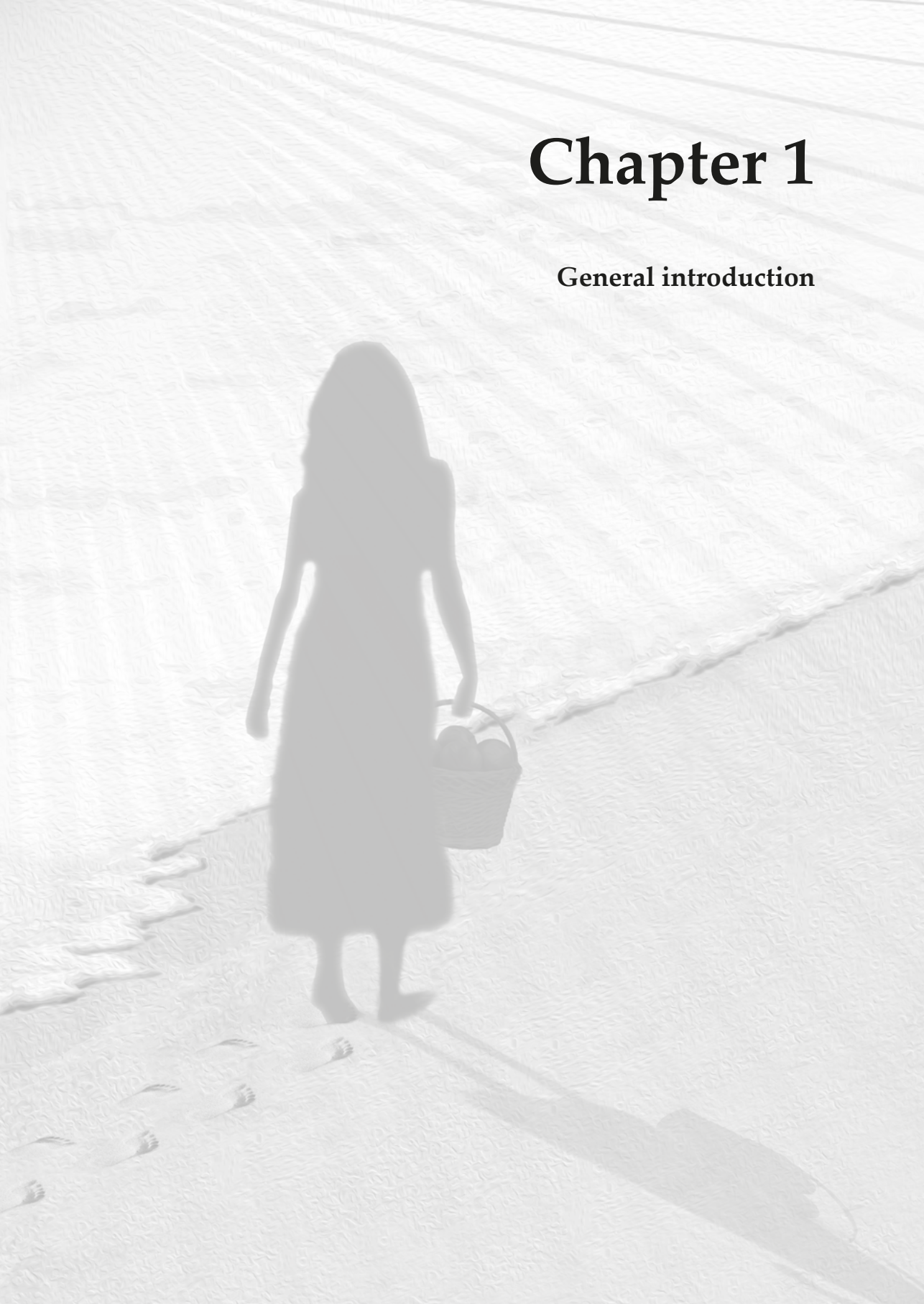
Chapter 1

General introduction



1.1. Introduction

Current choices might not always have favorable future consequences. This trade-off between current and future consequences is present in many life domains, but in particular in the domain of health behavior. Enjoying delicious food can be attractive now, but might have negative future health consequences. Being physically active can be unattractive now, but might have positive future health consequences. Both the intertemporal character of such decisions and the inherent trade-offs between potential costs and benefits makes them particularly challenging to deal with. Moreover, people's preferences and choices often change over time. Although many individuals decide to act healthily in the future, they often change their mind as time goes by and end up acting unhealthily. For example, when going out for dinner, an individual might initially decide to take a fruit salad as dessert, but at the end of the meal take a piece of chocolate cake instead.

Both food and exercise are an important part of everyday life. Every day, individuals make numerous food- and exercise-related decisions, such as what they will eat for breakfast, lunch, and dinner, or whether they will take the car or the bike to go to work or the supermarket. Whether these decisions turn out to be healthy or unhealthy, respectively active or inactive, will be determined by many factors, but eating and exercising behavior share at least one determinant. Both eating and exercising behavior contribute significantly to one's physical health and have in common that current actions are required in order to achieve future health benefits or prevent future health costs. Thus, a shared determinant of eating and exercising behavior is *time orientation*, referring to the extent to which individuals orient themselves toward the present or the future as well as the extent to which they take the present and future consequences of their current behavior into account. Therefore, the main aim of this dissertation is to provide insight into the relations between time orientation and both eating and exercising behavior in order to better understand individuals' intertemporal decision making in the health domain and ultimately stimulate healthy eating and exercising behavior.

In this chapter we first provide an introduction on eating and exercising behavior in which we pay attention to the similarities and differences between eating and exercising behavior and stress the importance of studying these two types of behavior simultaneously (Section 1.2). Next, we discuss the definition, conceptualization, and measurement of time orientation (Section 1.3). Thereafter, we discuss several related constructs and explain how these constructs are related to, yet different from, time orientation (Section 1.4). Subsequently, we discuss determinants of time orientation (Section 1.5), relations between time orientation and (health) behavior (Section 1.6), and potential underlying mechanisms explaining these relations (Section 1.7). Finally, we provide an overview of the aims of this dissertation and briefly describe each of the chapters (Section 1.8).

1.2. Eating and exercising behavior

Contemporary Western societies are confronted with rising levels of overweight and obesity (Cutler, Glaeser, & Shapiro, 2003; Finucane et al., 2011). The two main determinants of weight gain are energy intake (by means of caloric consumption) and energy expenditure (by means of physical activity). In order to keep a stable weight, the amount of energy consumed and the amount of energy expended need to be in balance. Therefore, prevention of weight gain can be reached by means of eating healthily or being physically active. In general, in order to lose weight, changes in eating behavior are more effective than changes in exercising behavior (Dunn, Hannan, Jeffery, Sherwood, Pronk, & Boyle, 2006). Nevertheless, several studies have shown that healthy eating only or being physically active only is insufficient. Instead, the combination of eating healthily and being physically active is most effective (Dunn et al., 2006; Jakicic, Wing, & Winters-Hart, 2002). Additionally, often there is an interplay between eating and exercising behavior. For example, compensation, licensing, or spillover effects can occur across eating and exercising behavior (e.g., Albaraccin, Wang, & Leeper, 2009; Khan & Dhar, 2006; Mata et al., 2009; Taylor, Webb, & Sheeran, 2014; van Kleef, Shimizu, & Wansink, 2011). Such effects can turn out negatively, for example, when people permit themselves to have an unhealthy snack after being physically active (i.e., licensing effect), but also positively, for example, when people who are motivated to exercise are also motivated to eat healthily (i.e., spillover effect) or when people decrease their food intake after exposure to exercise messages (i.e., compensation effect). For these reasons, it is important to investigate eating and exercising behavior simultaneously. Instead of focusing on eating behavior only or exercising behavior only, we investigate both types of behavior in order to get insight into the similarities and differences between them.

One potential difference between eating and exercising behavior is the extent to which people have to either perform or refrain from a particular type of behavior in order to act in a healthy way. Even though both healthy eating and exercising behavior are accompanied by future health benefits, there seem to be subtle perceptual differences regarding the ways in which these health benefits can be achieved. In order to eat healthily, people tend to believe that they have to refrain from a particular behavior (e.g., eating unhealthy food), whereas in order to be physically active, people tend to believe that they have to actively perform a particular behavior (e.g., playing sports). Such differences can be interpreted in terms of delayed-cost and delayed-benefit dilemmas (Giner-Sorolla, 2001). Unhealthy eating behavior constitutes a delayed-cost dilemma (as it comes with future health costs), whereas being physically active constitutes a delayed-benefit dilemma (as it comes with future health benefits). However, this perceived difference between eating and exercising behavior is not as straightforward as it might seem. In order to

eat healthily, people also have to actively perform a particular behavior (e.g., eating healthy food), whereas in order to be physically active, people also have to refrain from a particular behavior (e.g., being physically inactive). As such, healthy eating behavior constitutes a delayed-benefit dilemma (as it comes with future health benefits), whereas being physically inactive constitutes a delayed-cost dilemma (as it comes with future health costs). Nevertheless, in general, people perceive recommendations for changing their eating behavior as more persuasive than recommendations for changing their exercising behavior (Kees, 2011). Moreover, for eating behavior, messages framed in terms of prevention (e.g., "avoid unhealthy food") are *more* persuasive than messages framed in terms of promotion (e.g., "eat healthy food"). On the contrary, for exercising behavior, messages framed in terms of prevention (e.g., "avoid sedentary behavior") are *less* persuasive than messages framed in terms of promotion (e.g., "exercise more"). Similar differences were found for intentions to change behavior (Kees, 2011). Together, these findings confirm that people believe that it would be easier to refrain from a particular behavior, such as eating unhealthy food, than to actively perform a particular behavior, such as playing sports.

Despite the (perceived) differences between eating and exercising behavior, these two types of behavior have in common that current actions are required in order to achieve future benefits. In order to have a better health in the future, individuals have to eat healthy instead of unhealthy food, which might be associated with immediate costs in terms of sacrificed pleasure. Similarly, individuals have to be physically active instead of inactive, which might be associated with immediate costs in terms of time, money, and effort. Thus, current pleasure or convenience has to be sacrificed in order to achieve future health benefits. As such, health behavior is an outstanding example of a domain "in which individuals engage in an intrapersonal struggle over behaviors with immediate and distant consequences" (Strathman, Gleicher, Boninger, & Edwards, 1994, p. 750). This applies to eating and exercising behavior, as well, as both types of behavior are characterized by trade-offs between present and future consequences. Therefore, both eating and exercising behavior could be determined by time orientation, which refers to an individuals' general orientation toward the present or the future. This includes, but is not limited to, the extent to which individuals consider the present and future consequences of their current actions and take these considerations into account.

1.3. Definition, conceptualization, and measurement of time orientation

Time orientation is a broad concept and can be defined, conceptualized, and operationalized in multiple ways. In this dissertation, we use time orientation as an overarching concept, defined as a general orientation toward the present or the future. Three main conceptualizations of time orientation – discounting (Section 1.3.1), time perspective (Section 1.3.2), and consideration of future consequences (Section 1.3.3) – will be briefly introduced in this section (see also Figure 1.1 and Table 1.1). Our focus will be mainly on consideration of future consequences, because this is the key conceptualization of time orientation in this dissertation.

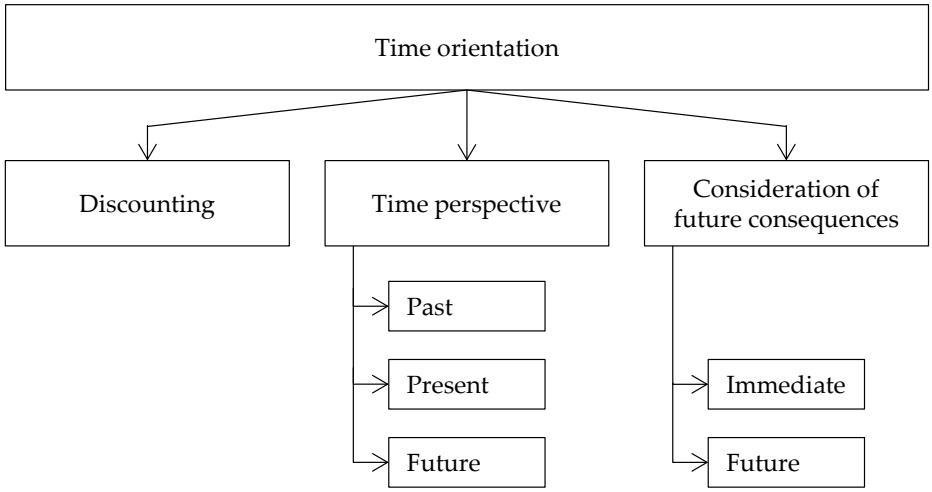


Figure 1.1. Overview of the main conceptualizations of time orientation.

1.3.1. Discounting

Discounting refers to the process of devaluation of future outcomes into present values which results in a lower valuation of future outcomes as compared to present outcomes (Frederick, Loewenstein, & O'Donoghue, 2002). Several terms are being used more or less interchangeably to refer to this phenomenon, for example, temporal discounting, time discounting, delay discounting, and time preference. Discounting is usually expressed in a discount rate, which can be measured as well as inferred. In many studies discount rates are elicited by means of time trade-off measures. Such measures consist of a series of choices between smaller, sooner outcomes and larger, later outcomes (e.g., Kirby, Petry, & Bickel, 1999). In some studies (proxies of) discount rates are inferred from behavior, for example, by assuming that smokers have a higher discount rate than non-smokers. For a more extensive discussion of discounting, we refer to Chapter 2 (Section 2.2.1).

Table 1.1. Definitions and measures of discounting, time perspective, and consideration of future consequences

Concept	Definition	Measure
Discounting	The extent to which individuals value future outcomes less than present outcomes (Frederick, Loewenstein, & O'Donoghue, 2002)	Time trade-off measures such as the Monetary Choice Questionnaire (MCQ; Kirby, Petry, & Bickel, 1999). The MCQ consists of 27 items.
Time perspective	The extent to which individuals orient themselves toward the past, the present, and the future (Zimbardo & Boyd, 1999)	Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999). The ZTPI consists of 56 items and five subscales: Past-Negative (PN), Past-Positive (PP), Present-Hedonistic (PH), Present-Fatalistic (PF), and Future (F).
Consideration of future consequences	The extent to which individuals consider the potential future consequences of their current behavior, including the extent to which they take these potential consequences into account (Strathman, Gleicher, Boninger, & Edwards, 1994)	Consideration of Future Consequences scale (CFC scale; Strathman, Gleicher, Boninger, & Edwards, 1994). The CFC scale consists of 14 items and two subscales: CFC-immediate (CFC-I) and CFC-future (CFC-F).

1.3.2. Time perspective

Time perspective refers to the extent to which individuals orient themselves toward the past, the present, and the future (Zimbardo & Boyd, 1999). Consequently, relatively stable individual differences in time perspective result from a differential focus on past, present, and future temporal frames. Time perspective is most commonly measured with the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999). This measure not only distinguishes between past, present, and future time perspective, but also between different variants of some of these perspectives. These distinctions are reflected in the five subscales of the ZTPI, labelled Past-Negative, Past-Positive, Present-Hedonistic, Present-Fatalistic, and Future. The original ZTPI consists of 56 items, but in some studies short forms are developed or only selected subscales are used. For a more extensive discussion of time perspective, we refer to Chapter 2 (Section 2.2.2).

1.3.3. Consideration of future consequences

Consideration of future consequences (CFC) reflects "the extent to which people 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). On the one end of the CFC continuum, individuals consider the future consequences of their current actions and take these considerations into account when making decisions. On the other end of the CFC continuum, individuals do not

consider the future consequences of their actions, but instead consider the immediate consequences of their current actions and take these considerations into account when making decisions. Both can take an extreme form when individuals fully ignore either the present or future consequences of their actions. This conceptualization as a continuum, however, excludes the possibility that individuals are highly concerned about both the present and future consequences of their behavior or do not care about the consequences of their behavior at all regardless of when these consequences will occur. Consideration of future consequences is measured with the Consideration of Future Consequences scale (CFC scale; Strathman et al., 1994). Multiple studies indicate that the CFC scale consists of two subscales (e.g., Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008), one of which reflects consideration of future consequences (labeled CFC-future), whereas the other one reflects consideration of immediate consequences (labeled CFC-immediate). For a more extensive discussion of consideration of future consequences, we refer to Chapter 2 (Section 2.2.3).

1.4. Constructs related to time orientation

Although time orientation in itself already is a broad construct, there are several other constructs that are to some extent conceptually or empirically related to time orientation. In order to clearly delineate time orientation, it is necessary to discuss the distinction between these constructs and time orientation. The main difference between the conceptualizations of time orientation as discussed in Section 1.3 and the related constructs that will be discussed in this section is that the latter focus less specifically on the concept of time. In this section, we briefly discuss delay of gratification (Section 1.4.1), impulsivity (Section 1.4.2), self-control (Section 1.4.3), and elaboration on potential outcomes (Section 1.4.4) and explain how they are related to, yet different from, time orientation.

1.4.1. Delay of gratification

Delay of gratification refers to the ability to defer immediate gratification for the sake of future gratification (Mischel, Shoda, & Rodriguez, 1989) and thus seems to be closely related to time orientation. However, delay of gratification studies usually offer participants choices between two *positive* outcomes, differing in magnitude and delay (Mischel, Ayduk, & Mendoza-Denton, 2003). The only difference between the alternatives is that one option is smaller, but immediately available (e.g., one marshmallow now), whereas the other option is larger, but has to be waited for (e.g., two marshmallows in fifteen minutes). In this way, delay of gratification studies are different from intertemporal choice studies in which both alternatives are often available at the same time, but one of them is healthy and the other one is unhealthy

(e.g., Read & van Leeuwen, 1998). Nevertheless, delay of gratification studies are comparable to discounting studies in which choices between smaller, sooner and larger, later outcomes have to be made (e.g., Kirby et al., 1999). In addition, trait delay of gratification has been found to be positively related to consideration of future consequences (Strathman et al., 1994).

1.4.2. Impulsivity

Impulsivity can be defined as "the choice of less rewarding over more rewarding alternatives" (Ainslie, 1975, p. 463). As such, impulsivity contrasts with delay of gratification. Additionally, every choice for a smaller, but sooner available alternative instead of a larger, but later available alternative can be labeled as an impulsive choice. In this way, discounting is just an aspect of impulsivity (Reimers, Maylor, Stewart, & Chater, 2009). Another aspect of impulsivity is that impulsive choices are often made without considering the future consequences of these choices (Peterson, Hill, Marshall, Stuebing, & Kirkpatrick, 2015). Indeed, impulsivity is negatively related to both future time perspective and consideration of future consequences (Joireman, Anderson, & Strathman, 2003; MacKillop, Anderson, Castelda, Mattson, & Donovick, 2006) and positively related to present time perspective (MacKillop et al., 2006).

1.4.3. Self-control

Self-control refers to individuals' ability of exerting control over the self and involves inhibiting or altering automatic or undesirable behavior (Tangney, Baumeister, & Boone, 2004). Without the ability to resist the tendency to succumb to current temptations, it would be impossible to reach long-term goals (which are often in conflict with one's immediate impulses). Thus, there is a clear conceptual relation between self-control and both delay of gratification and impulsivity, yet, in opposite directions. In addition, trait self-control is related to discounting, as those with higher levels of self-control discount future outcomes less (Charlton, Gossett, & Charlton, 2011; Daly, Delaney, & Harmon, 2009). Also, trait self-control is positively related to both future time perspective and consideration of future consequences and negatively related to both present time perspective and consideration of immediate consequences (Ein-Gar, Goldenberg, & Sagiv, 2012; Joireman et al., 2008).

1.4.4. Elaboration on potential outcomes

Individuals' tendency to elaborate on the potential outcomes of their behavior involves the generation, evaluation, and encoding of the potential positive and negative consequences of their behavior (Nenkov, Inman, & Hulland, 2008). Two differences between consideration of future consequences and elaboration on potential outcomes

are that the latter distinguishes different stages (e.g., generation and evaluation) and foci (e.g., positive, negative) of thinking about the potential consequences of one's behavior. In this way, elaboration on potential outcomes is a more specific and detailed construct than consideration of future consequences. Nevertheless, consideration of future consequences is positively related to the generation and evaluation dimensions of elaboration on potential outcomes (Nenkov et al., 2008).

1.5. Determinants of time orientation

Several types of determinants of time orientation can be distinguished. For example, it has been proposed that a combination of developmental, neuropsychological and personality factors influences the extent to which individuals consider the future consequences of their behavior (Joireman, Strathman, & Balliet, 2006). In this section, we briefly discuss five types of determinants of time orientation, demographic characteristics (Section 1.5.1), personality characteristics (Section 1.5.2), biological factors (Section 1.5.3), future factors (Section 1.5.4), and context factors (Section 1.5.5). Some of these types of determinants have almost exclusively been studied in relation to one specific conceptualization of time orientation (e.g., biological factors in relation to discounting). However, given the relations between different conceptualizations of time orientation (see Section 2.2.4), results of such studies also shed light on the potential determinants of the other concepts. Therefore, in this section we do not focus solely on consideration of future consequences, but also discuss discounting and time perspective.

1.5.1. Demographic characteristics

Several demographic characteristics, such as gender, age, education, and income, have been found to be related to time orientation. With regard to gender, it has been found that men and women have similar discount rates (Harrison, Lau, & Williams, 2002), but also, contradictorily, that women have higher discount rates than men (Reimers et al., 2009). In contrast, women are more likely to consider the future consequences of their behavior, whereas men are more likely to consider the immediate consequences of their behavior (Robbins & Burleson, 2015). With regard to age, seemingly contradictory results have been found, as well. In general, younger people (and especially children) are impatient, because they do not yet have (fully) acquired self-control skills, whereas older people are able to wait for delayed rewards. For example, children discount delayed rewards more than younger adults, who in turn discount delayed rewards more than older adults (Green, Fry, & Myerson, 1994; see also Reimers et al., 2009). However, it has also been found that older people discount delayed rewards *more* than younger people and that middle-aged people

discount less than both of these groups (Read & Read, 2004). This indicates that impatience can increase again at the end of the lifespan, possibly because the future seems to be shorter for older people than for younger or middle-aged people. In addition, positive relations between age and future orientation as well as negative relations between age and present orientation have been found (Zimbardo & Boyd, 1999). Both education and income are negatively related to discount rates, indicating that a higher (lower) income and more (less) education are related to less (more) discounting (Harrison et al., 2002; Reimers et al., 2009).

1.5.2. Personality characteristics

Multiple studies investigated relations between Big Five personality characteristics and time orientation (e.g., Daugherty & Brase, 2010). For example, high levels of conscientiousness and openness are related to lower discount rates, high levels of extraversion and neuroticism are related to higher discount rates, and agreeableness is not related to discount rates (Mahalingam, Stillwell, Kosinski, Rust, & Kogan, 2014). Similar results were found in another study, but only for conscientiousness and extraversion (Daly et al., 2009). Yet another study found no relations at all between personality characteristics and discounting (Adams & Nettle, 2009). Other studies investigated relations between personality characteristics and time perspective or consideration of future consequences. Agreeableness, conscientiousness, openness (Adams & Nettle, 2009; Rappange, Brouwer, & van Exel, 2009), and extraversion (Rappange et al., 2009) have been found to be positively related to consideration of future consequences, whereas neuroticism has been found to be either negatively (Adams & Nettle, 2009) or positively (Rappange et al., 2009) related to consideration of future consequences. Specifically, conscientiousness is positively related to CFC-future and negatively related to CFC-immediate (Bruderer Enzler, 2015; Gick, 2014) and has also been found to be positively related to future time perspective (as measured with the ZTPI; Adams & Nettle, 2009). Generally, conscientiousness (as compared to other personality characteristics) shows the strongest relations with different conceptualizations of time orientation.

1.5.3. Biological factors

A range of biological factors, such as physiological factors, metabolic mechanisms, hormones, and neurological factors, has been found to be predictive of time orientation (in most studies conceptualized as discounting). For example, it has been found that discount rates are negatively related to heart rate and positively to systolic blood pressure (Daly et al., 2009). Additionally, higher blood glucose levels are related to lower levels of discounting (Wang & Dvorak, 2010) and lower cortisol levels are related to higher levels of discounting (Takahashi, 2004). Additionally,

research into the neural predictors of intertemporal choice, has found different brain areas to be specifically linked to shortsighted decisions (i.e., choosing an immediate reward over a delayed reward) and farsighted decisions (i.e., choosing a delayed reward over an immediate reward; Liu & Feng, 2012). Moreover, some brain areas are only active when choice options include an immediate reward, whereas other brain areas are also active when choice options include two delayed rewards (McClure, Laibson, Loewenstein, & Cohen, 2004). Note that these findings support a multidimensional conceptualization of time orientation (i.e., present and future, see Section 1.3).

1.5.4. Future factors

Time orientation can also be determined by factors that are related to the (in) ability to imagine the future. One such factor is the extent to which individuals feel psychologically connected to their future self. Specifically, stronger psychological connectedness between present and future selves is related to lower discount rates (Bartels & Rips, 2010; Joshi & Fast, 2013). Moreover, visualization of one's future self increased psychological connectedness between one's present and future selves, which in turn decreased discount rates (Hershfield, Goldstein, Sharpe, Fox, Yeykelis, Carstensen, & Bailenson, 2011). Individuals do not only experience difficulties imaging their future selves, but also tend to misestimate or underestimate the needs and wants of their future selves. For example, it has been suggested that individuals have a limited telescopic faculty, which leads them to underestimate future pleasure (Pigou, 1920, as cited in Frederick et al., 2002). Additionally, intrapersonal empathy gaps make it difficult to imagine what it would be like to be in a different visceral state in the future (Fisher & Rangel, 2014; Read & van Leeuwen, 1998). Intrapersonal empathy gaps can have two directions, hot-to-cold (e.g., imagining being satiated while being hungry now) and cold-to-hot (e.g., imagining being hungry while being satiated now). The hot-to-cold empathy gap leads individuals to overestimate the value of food, whereas the cold-to-hot empathy gap leads individuals to underestimate the value of food (Fisher & Rangel, 2014). Consequently, these empathy gaps result in other intertemporal choices as compared to when individuals would be able to imagine their future state.

1.5.5. Context factors

Several context factors can have an influence on time orientation and, more specifically, intertemporal choice. For example, people prefer improving sequences (instead of deteriorating sequences; Loewenstein & Prelec, 1991) and happy endings (Ross & Simonson, 1991). If they have to order several temporally separated outcomes, people are more satisfied with the whole experience if it ends with a

positive outcome. Similarly, people make different intertemporal choices depending on whether the choice context is simultaneous or sequential (Read, Antonides, van den Ouden, & Trienekens, 2001) or when choices are presented in a single evaluation or joint evaluation format (Okada, 2005). In simultaneous choice (as compared to sequential choice) people seek more variety than they actually would like. In this way simultaneous choice often leads to worse outcomes than sequential choice (Read et al., 2001). When choice alternatives are presented jointly, people experience difficulty justifying a hedonic choice and consequently tend to prefer the utilitarian alternative. However, when hedonic and utilitarian alternatives are presented separately, people tend to prefer the hedonic alternative (Okada, 2005). Also, the extent to which people dread a future loss or experience pleasure due to anticipating a future gain influences their choices (Hardisty, Frederick, & Weber, 2016; Loewenstein, 1987). When people enjoy anticipating a future gain they are willing to delay it, whereas when they dread anticipating a future loss, they would like to speed it up. This effect is asymmetrical in strength, with the effect of dread being larger than the effect of savoring.

1.6. Time orientation and behavior

Many studies have been conducted on relations between time orientation and behavior, not only in the health domain, but also, for example, in the financial or environmental domain. However, there seem to be subtle differences between the three main conceptualizations of time orientation and the types of behavior or domains that they have been mainly found to be related to. Therefore, we discuss the relation between time orientation and behavior separately for discounting (Section 1.6.1), and time perspective and consideration of future consequences (Section 1.6.2).

1.6.1. Discounting

Discounting is related to a range of behaviors in the domains of money, employment, education, consumption, and the environment (for an overview, see Urminsky & Zauberman, 2015). In addition, discounting is related to several types of health behavior (for a review, see Story, Vlaev, Seymour, Darzi, & Dolan, 2014), such as substance use (Kirby et al., 1999; see also Teuscher & Mitchell, 2011), smoking (Baker, Johnson, & Bickel, 2003; Reimers et al., 2009), body mass index (BMI; Borghans & Golsteyn, 2006; Reimers et al., 2009; see also Teuscher & Mitchell, 2011), and exercising behavior (Tate, Tsai, Landes, Rettiganti, & Lefler, 2015). However, other studies have found that discounting is *not* related to various types of health behavior (Adams & Nettle, 2009; Dassen, Houben, & Jansen, 2015; Daugherty & Brase, 2010). Thus, although the health domain has been studied thoroughly (Urminsky

& Zauberman, 2015), results are often inconsistent. Part of this inconsistency can probably be explained by the use of monetary discount rates to explain behavior in another domain (e.g., health). For a more extensive discussion of discounting in relation to health behavior, we refer to Chapter 2 (Sections 2.3.1 and 2.4.1).

1.6.2. Time perspective and consideration of future consequences

Both time perspective and consideration of future consequences have been found to be related to a wide variety of behaviors, such as sustainable and environmentally-friendly behavior (Arnocky, Milfont, & Nicol, 2014; Bruderer Enzler, 2015; Carmi, 2013a; Carmi, 2013b; Carmi & Arnon, 2014; Khachatryan, Joireman, & Casavant, 2013; see also Milfont, Wilson, & Diniz, 2012), academic performance (Joireman, 1999; Peters, Joireman, & Ridgway, 2005), job performance (Graso & Probst, 2012), leadership behavior (Zhang, Wang, & Pearce, 2014), procrastination (Sirois, 2014), impulsive buying (Joireman, Sprott, & Spangenberg, 2005), credit card use (Joireman, Kees, & Sprott, 2010), gambling (MacKillop et al., 2006; see also Teuscher & Mitchell, 2011), risky driving (Zimbardo, Keough, & Boyd, 1997), aggressive behavior (Joireman et al., 2003; see also Teuscher & Mitchell, 2011), safety behavior (Probst, Graso, Estrada, & Greer, 2013), moral judgments (Agerström & Björklund, 2013), and ethical behavior (Hershfield, Cohen, & Thompson, 2012).

Additionally, these constructs are predictive of a range of health behaviors, including substance use (Keough, Zimbardo, & Boyd, 1999; see also Teuscher & Mitchell, 2011), alcohol use (Beenstock, Adams, & White, 2011; McKay, Dempster, & Mello, 2015; McKay, Percy, & Cole, 2013a; McKay, Percy, & Cole, 2013b), smoking (Adams, 2012; Adams & Nettle, 2009; Adams & White, 2009; Kovač & Rise, 2007), preventive behavior (e.g., participation in diabetes screening (Crockett, Weinman, Hankins, & Marteau, 2009), getting vaccinations (Nan & Kim, 2014), and sunscreen use (Orbell & Kyriakaki, 2008)), sleep habits and quality (Peters et al., 2005), body mass index (Adams, 2012; Adams & Nettle, 2009; Adams & White, 2009; Griva, Tseferidi, & Anagnostopoulos, 2015), perceived health status (Griva et al., 2015; Rappange et al., 2009), and several other health behaviors (Daughery & Brase, 2010; Vogel, Brug, van der Ploeg, & Raat, 2010).

Finally, time perspective and consideration of future consequences are related to healthy eating attitudes, intentions, and behavior (Dassen et al., 2015; Gick, 2014; Joireman, Shaffer, Balliet, & Strathman, 2012; Luszczynska, Gibbons, Piko, & Tekozel, 2004; Mullan, Allom, Brogan, Kothe, & Todd, 2014; Piko & Brassai, 2009) and exercising attitudes, intentions, and behavior (Adams & Nettle, 2009; Griva et al., 2015; Hall & Epp, 2013; Hall & Fong, 2003; Joireman et al., 2012; Luszczynska et al., 2004; Stahl & Patrick, 2011; Wininger & DeSena, 2012).

1.7. Potential underlying mechanisms

The mechanisms by which time orientation influences behavior are largely unstudied. In their integrative model of intertemporal decision making, Joireman et al. (2006) posit three potential underlying mechanisms explaining the relations between consideration of future consequences and choices, intentions, and behavior. First of all, they suggest that considering the immediate or future consequences of one's behavior is related to construal level, referring to the level at which individuals mentally represent situations. Specifically, individuals low in CFC would be more likely to have a lower, concrete level of construal, whereas individuals high in CFC would be more likely to have a higher, abstract level of construal. Consequently, individuals low in CFC would focus more on the feasibility of a particular behavior (which is a characteristic of low-level construals), whereas individuals high in CFC would focus more on the desirability of a particular behavior (which is a characteristic of high-level construals, see Liberman & Trope, 1998). In turn, this would explain differences in, for example, health behavior between individuals with different levels of consideration of future consequences. Second, they suggest that temporal discounting is related to both consideration of future consequences and construal level. Specifically, they argue that individuals low in CFC would focus more on the certainty of a particular outcome, whereas individuals high in CFC would focus more on the magnitude of a particular outcome. Consequently, this would result in different preferences when individuals have to choose between smaller, but certain outcomes and larger, but uncertain outcomes (see also Joireman et al., 2012). Such trade-offs are typical of many types of health behavior and this mechanism would thus explain differences in health behavior between individuals with different levels of consideration of future consequences. Finally, individuals high in CFC may be more likely to be able to delay gratification than individuals low in CFC (see also Strathman et al. (1994) and Section 1.4.1). The ability to delay gratification is necessary for many types of health behavior and thus, delay of gratification is yet another mechanism by which time orientation could influence health behavior.

Another concept that has been proposed to explain relations between time orientation and behavior is regulatory focus (Joireman et al., 2012). Regulatory focus theory (Higgins, 1997) states that there are two independent self-regulatory orientations. The aim of a promotion focus is achieving positive outcomes, whereas the aim of a prevention focus is avoiding negative outcomes. It was found that only CFC-future was related to a promotion focus, whereas both CFC-future and CFC-immediate were related to a prevention focus. In turn, promotion focus mediated the relation between CFC-future and healthy eating and exercising attitudes and intentions. However, prevention focus did not mediate relations between CFC and healthy eating and exercising attitudes and intentions (Joireman et al., 2012).

1.8. Aims and outline of the dissertation

The main aim of this dissertation is to provide insight into the relations between time orientation and both eating and exercising behavior. The main aim can be divided into three specific aims (see Figure 1.2). First of all, whereas various studies have already investigated differences in time orientation across domains (e.g., money, health, the environment), we aim to investigate differences in time orientation across various types of behavior within a domain. Specifically, we aim to investigate whether time orientation for eating behavior and time orientation for exercising behavior are different constructs (see Figure 1.2, specific aim 1). Second, we aim to investigate whether the relations between time orientation and preferences, choices, and behavior are different across eating and exercising behavior. Specifically, we aim to investigate the differential effects of present and future orientation on eating and exercising behavior (see Figure 1.2, specific aim 2). Third, we aim to get insight into a potential underlying mechanism explaining relations between time orientation and eating and exercising behavior. Specifically, we investigate the role of both trait and state construal level (see Figure 1.2, specific aim 3). These three specific aims will be dealt with in one theoretical chapter (Chapter 2) and three empirical chapters (Chapters 3 till 5). Chapters 2 and 3 are mainly related to the first two specific aims, whereas Chapters 4 and 5 are mainly related to the third specific aim (but also to the second specific aim).

In **Chapter 2** we provide a theoretical overview of research on time orientation and its relations with health behavior. First, we discuss and compare various conceptualizations of time orientation, such as discounting, time perspective, and consideration of future consequences, and ways to operationalize these concepts. Thereafter, we discuss the extent to which time orientation is a domain-general or domain-specific construct by reviewing studies that compare time orientation in various domains, such as money and health. Finally, we discuss relations between time orientation and health behavior. As discussed in Chapter 2, it is recommended that measurement of time orientation takes place at a behavior-specific level instead of at a domain-specific level. Therefore, in **Chapter 3** we develop two behavior-specific variants of the Consideration of Future Consequences scale (see Appendix), one for eating behavior (labeled CFC-food) and one for exercising behavior (labeled CFC-exercise). In two studies, we examine whether these scales tap into different constructs and whether they both consist of CFC-future and CFC-immediate subscales. Additionally, we aim to get some preliminary insight into how the behavior-specific CFC scales as well as their future and immediate subscales are related to behavior. Therefore, we investigate whether CFC-food and CFC-exercise differentially predict self-reported eating and exercising behavior.

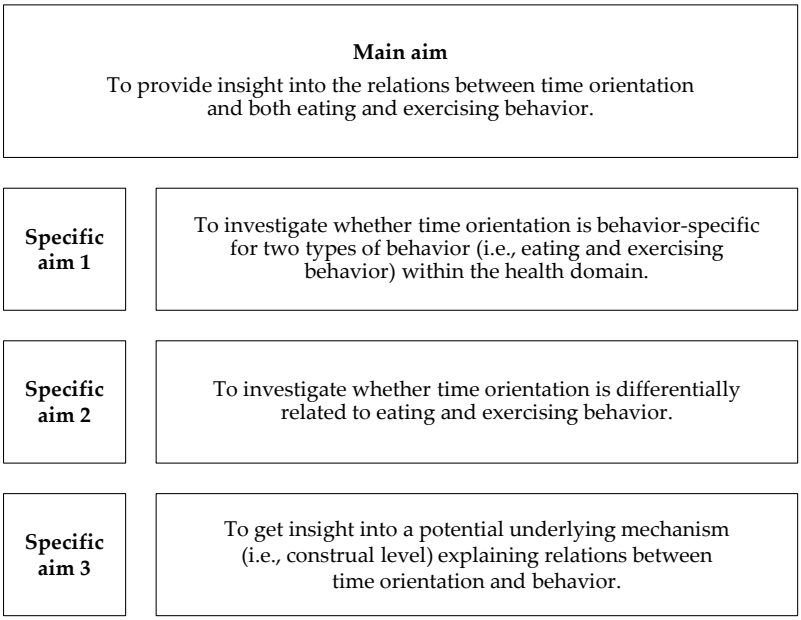


Figure 1.2. Overview of the main and specific aims of this dissertation.

In Chapters 4 and 5 we aim to get insight into a potential underlying mechanism explaining relations between time orientation and eating and exercising behavior. In **Chapter 4** we report a study in which we measured time orientation, construal level, eating and exercising behavior as well as eating and exercising preferences. With this study we aim to replicate the findings in Chapter 3 by investigating the differential relations between consideration of immediate and future consequences and self-reported eating and exercising behavior. Furthermore, we investigate construal level as a potential underlying mechanism explaining relations between time orientation and eating and exercising behavior. Finally, we measure 'behavior' at two levels. We measure both general eating and exercising behavior (matching a high level of construal) and specific eating and exercising preferences (matching a low level of construal). In **Chapter 5** we report two experiments on intertemporal food choice that extend the study reported in Chapter 4 in two ways. First of all, we manipulate construal level instead of measuring it. Second, we investigate the effect of this construal level manipulation on actual intertemporal food choice. Additionally, we investigate whether consideration of immediate and future consequences predict actual intertemporal food choice as well as self-reported eating behavior.

In **Chapter 6**, the general discussion, we provide an overview of the main findings and their theoretical, methodological, and practical implications. In addition, we provide suggestions for future research and the final conclusions that can be drawn from the research presented in this dissertation.

As a final remark, we would like to note that this dissertation consists of a published book chapter (Chapter 2) as well as articles that are either published (Chapters 3 and 4) or in progress for publication (Chapter 5) in scientific journals. Therefore, the chapters can be read independently, but they will also overlap to some extent. Additionally, there might be minor inconsistencies across chapters due to their differential publication statuses. Please note that all references are collected in a separate section (see page 129) instead of at the end of every chapter.

Chapter 2

Time orientation effects on health behavior

This chapter is in press as:

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (in press-b). Time orientation effects on health behavior. In M. Altman (Ed.), *Handbook of behavioral economics and smart decision-making: Rational decision-making within the bounds of reason.* Cheltenham: Edward Elgar Publishing.

Abstract

Many everyday decisions have an intertemporal character and are consequently influenced by an individual's time orientation. In Section 2.2, we discuss and compare various conceptualizations of time orientation, such as discounting, time perspective and consideration of future consequences, and ways to measure these concepts. In addition, we provide an overview of studies on the relations between various time orientation measures. In Section 2.3, we discuss the extent to which time orientation is a domain-general or domain-specific construct, by reviewing studies that compare time orientation across and within various domains, such as money and health. In Section 2.4, we discuss the relationship between time orientation and health behavior. We conclude with a general discussion of the different constructs and measures.

2.1. Introduction

Many everyday choices have an intertemporal character, which manifests itself in the trade-offs that have to be made between outcomes that will appear at different moments in time. This is what apparently different choices, such as saving or spending money, taking or refusing vaccinations, and eating a healthy or an unhealthy meal, have in common. Each of these decisions involves a trade-off between a sooner, but often smaller, outcome (e.g., enjoying a tasty dinner) and a later, but often larger, outcome (e.g., being in good health). Predictions regarding such intertemporal choices may differ substantially between the standard economic model and the behavioral economic model, especially with regard to the human tendency to attach disproportionally high value to present outcomes (as compared to future outcomes). Such behavior may be beneficial in times of food scarcity, but is suboptimal in contemporary Western societies in which food is abundantly available. Stanovich (2010) points to Type 1 processes (fast and automatic) as being related to such suboptimal behavior, whereas Type 2 processes (slow and analytic) are being useful in overriding Type 1 processes. Both tempting situations and individuals' bounded rationality seem to act as barriers to the use of Type 2 processes. Hence, it appears to be smart to distinguish situations in which suboptimal behavior cannot be harmful (e.g., in terms of future health) from situations that are potentially harmful. For example, in a situation in which a dietician decides about an individual's food choice, he can freely satisfy his immediate desires. However, in situations in which commercial motives drive product offerings, he has to be careful and take into account the future consequences of his actions. Consequently, such choices are influenced by individual differences in time orientation, which is one's orientation toward and concern with the present and the future.

In this chapter, we first give a brief overview of three different, yet related conceptualizations of time orientation. We discuss discounting (Section 2.2.1), time perspective (Section 2.2.2), and consideration of future consequences (Section 2.2.3) and provide some examples of instruments to measure these concepts. Additionally, we provide an overview of studies on the relations between various time orientation measures (Section 2.2.4). Subsequently, we discuss the extent to which time orientation varies across domains, such as money, health, and the environment, but also within domains, such as across various types of health behavior. Differences across domains have mainly been examined in studies on discounting (Section 2.3.1), whereas differences within domains have mainly been examined in studies on time perspective and consideration of future consequences (Section 2.3.2). Finally, we discuss the predictive capacity of various time orientation measures with respect to health behavior (Section 2.4.1) as well as some measurement issues that impede interpretation of the relationship between time orientation and health behavior (Section 2.4.2).

2.2. Conceptualization and measurement of time orientation

Time orientation can be defined and operationalized in various ways. Generally, a distinction can be made between economic concepts (e.g., time preference, discounting) and psychological concepts (e.g., time perspective, consideration of future consequences). In this chapter, we will use *time orientation* as an overarching concept and define this concept as a general orientation toward either the present or the future. This definition does not include an orientation toward the past. Although it is possibly beneficial to also focus on past orientation in future research (Griva, Tseferidi, & Anagnostopoulos, 2015), to date the majority of studies have focused on present versus future orientation. In this section we will discuss and compare three major conceptualizations of time orientation: discounting, time perspective, and consideration of future consequences. We do not discuss a range of other concepts, such as delay of gratification (e.g., Mischel, Ayduk, & Mendoza-Denton, 2003), impulsivity (e.g., Ainslie, 1975), psychological distance and construal level (e.g., Trope & Liberman, 2010), and elaboration of potential outcomes (Nenkov, Inman, & Hulland, 2008), because, even though they are to some extent related to time orientation, they do not specifically focus on the concept of time. The three concepts that we do discuss cover both economic and psychological literatures on time orientation. Additionally, these concepts are widely used in research on domain differences in time orientation (see Section 2.3) as well as in studies on time orientation and health behavior (see Section 2.4).

2.2.1. Discounting

Discounting generally refers to the phenomenon that future outcomes are valued less than present outcomes. Several terms, such as temporal discounting, time discounting, delay discounting and time preference, are used more or less interchangeably to refer to this phenomenon, but subtle differences in meaning and usage across disciplines exist (Doyle, 2013; Frederick, Loewenstein, & O'Donoghue, 2002). In this chapter we will consistently refer to this phenomenon with the overarching term *discounting*. In addition to the various terms used to describe discounting, many different models of discounting exist (for an overview, see Doyle, 2013). Here, we briefly discuss two of the main variants of discounting: exponential discounting and hyperbolic discounting. Exponential discounting assumes a constant decline in the perceived value of an outcome as the outcome materializes further into the future. For example, the discount rate may be 10% in each year of a period of 10 years. Thus, in continuous time, the discount rate is captured by an exponential function. Although this is generally considered to be the standard form of discounting, empirical research showed that individuals' actual behavior deviates

from the assumption of a constant discount rate (Read, 2004). For example, the discount rate may be 10% in the first year of a period of 10 years and less than 10% in the years thereafter. This is captured in a hyperbolic function, which resembles more closely an individual's high discount rate in the near future and lower discount rate in the distant future. Research has established several additional deviations from standard discounting, including delay, magnitude, and sign effects (Thaler, 1981), direction effects (Loewenstein, 1988), sequence effects (Loewenstein & Prelec, 1993), and interval effects (or subadditive discounting; Read, 2001), as well as interactions between these effects (Read, 2004). Such effects can be considered as sensible or smart, but incompletely rational, behavior. This may lead to suboptimal outcomes in a rational sense, but satisfactory outcomes in the human sense.

A common approach to elicit discount rates is direct measurement by means of time trade-off measures, consisting of choices between a smaller, sooner (SS) reward and a larger, later (LL) reward. Time trade-off measures can be constructed in various ways (Hardisty, Thompson, Krantz, & Weber, 2013). Open questions basically ask for the lowest amount at which the LL-reward is preferred. Cascade questions ask for a series of forced choices between a specific SS-reward and a specific LL-reward, consecutively narrowing down the difference between the rewards (Fuchs, 1982). An example of a validated measure to elicit discount rates is the Monetary Choice Questionnaire (Kirby, Petry, & Bickel, 1999), which consists of 27 choices between monetary SS- and LL-rewards (e.g., $14 today or $25 in 19 days). All of these measures can be either incentivized or non-incentivized. Incentivized choices have direct consequences for the decision maker, because the chosen option is paid off. Alternatively, one of the choices or one of the decision makers may be paid out at random after all choices have been made (Harrison, Lau, & Williams, 2002). Non-incentivized choices are in fact hypothetical, because the chosen option is not paid off. However, several studies suggest that hypothetical rewards are discounted in the same way as real rewards (e.g., Madden, Begotka, Raiff, & Kastern, 2003).

Some studies do not measure discount rates directly, but infer them from behavior. For example, in choosing between cheap, but energy-consuming, equipment and expensive, but energy-saving, equipment consumers have to trade off current costs and future benefits. Consequently, implicit discount rates have been estimated from consumers' choices of air conditioners (Hausman, 1979) and refrigerators (Gately, 1980). Also, proxies of the discount rate have been inferred from behavior. For example, smokers are assumed to have a higher discount rate than non-smokers. This method is often used when researchers make use of existing datasets, for example the DNB Household Survey (Borghans & Golsteyn, 2006). In this case, questions about financial management, saving behavior, and risk-taking behavior can be used as proxies for the discount rate. In another study, variables

such as education level, smoking, exercising, use of nutrition labels, and motivation to acquire nutrition knowledge were used as proxies for the discount rate (Huston & Finke, 2003). Subsequently, this inferred discount rate was used to predict healthy eating behavior. Although this method is sometimes the only possibility and uses reasonable indicators, it still poses problems. For example, when discount rates are inferred from smoking, it becomes impossible to use the same discount rate to predict smoking. Nevertheless, it is possible to predict different behaviors than the one from which the discount rate is inferred. For a more extensive discussion of intertemporal choice and discounting, we refer to Loewenstein and Prelec (1992), Frederick et al. (2002), Berns, Laibson, and Loewenstein (2007), and Scholten and Read (2010).

2.2.2. Time perspective

Time perspective is a relatively stable individual trait that refers to the extent to which individuals orient themselves toward the past, the present, and the future. Whereas early studies on time perspective often used projective techniques to elicit an individual's time perspective (for an overview, see Teuscher & Mitchell, 2011), later studies measured time perspective directly through questionnaires. Although various other instruments exist, the Zimbardo Time Perspective Inventory (ZTPI) is currently the most widely used measure of time perspective. The ZTPI was developed by Zimbardo and Boyd (1999) in order to comprehensively measure the multidimensional construct of time perspective in a valid and reliable way. In addition to distinguishing between the past, the present, and the future, Zimbardo and Boyd (1999) made distinctions between different variants of these orientations. As a result, the ZTPI consists of five subscales, each measuring a distinct temporal orientation. The Past-Negative subscale reflects a negative view on the past (e.g., focusing on painful past experiences), whereas the Past-Positive subscale reflects a positive view on the past (e.g., feelings of nostalgia). The Present-Hedonistic subscale reflects a positive view on the present, without concerns about future consequences (e.g., acting impulsively), whereas the Present-Fatalistic subscale reflects a negative view on the present (e.g., feelings of hopelessness). Finally, the Future subscale reflects a general view on the future (e.g., focusing on obtaining future goals). Recent research has added several dimensions to these five dimensions (for an overview, see Stolarski, Fieulaine, & van Beek, 2015, p. 8). The original ZTPI consists of 56 items, but various short forms are being used as well. Although Zimbardo and Boyd (1999) reported that the ZTPI has acceptable reliability, later studies have reported lower reliability, which is probably due to the inclusion of items that are not directly related to time perspective (Crockett, Weinman, Hankins, & Marteau, 2009). For an extensive overview of research on time perspective, we refer to Stolarski et al. (2015).

2.2.3. Consideration of future consequences

Whereas most conceptualizations of time orientation are fairly general, consideration of future consequences (CFC) is a much more specific concept. It reflects "the extent to which people consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes" (Strathman, Gleicher, Boninger, & Edwards, 1994, p. 743). To measure this construct, Strathman et al. (1994) developed the Consideration of Future Consequences scale (CFC scale). Originally, both the construct and the scale were one-dimensional. On the one end of the continuum, individuals would be completely present-oriented (i.e., focusing solely on the immediate consequences of their behavior while neglecting the future consequences) and at the other end of the continuum, individuals would be completely future-oriented (i.e., focusing solely on the future consequences of their behavior while neglecting the immediate consequences). Later studies showed that the CFC scale actually captures a two-dimensional construct. Petrocelli (2003) was the first to examine the factor structure of the CFC scale and recommended the use of an 8-item short version of the original 12-item scale. Subsequent studies showed that the CFC scale actually consists of two factors (Adams, 2012; Bruderer Enzler, 2015; Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008; Joireman, Shaffer, Balliet, & Strathman, 2012; Rappange, Brouwer, & van Exel, 2009; Toepoel, 2010; Vásquez Echeverría, Esteves, Gomes, & Ortuño, 2015). One of these factors reflects consideration of future consequences (labeled CFC-future, consisting of five items), whereas the other one reflects consideration of immediate consequences (labeled CFC-immediate, consisting of seven items, Joireman et al., 2008). Some studies have found different factor solutions (i.e., either one factor or more than two factors; Ainin, Jaafar, & Dezdar, 2015; Crockett et al., 2009; Hevey et al., 2010; McKay, Cole, & Percy, 2015; McKay, Morgan, van Exel, & Worrell, 2015; Ryack, 2012; Zhang, Kong, Zhang, & Li, 2015). Generally, the CFC scale has good reliability, although this could be partly due to the fact that respondents who have difficulties with understanding the items tend to consistently use the midpoint of the scale (Crockett et al., 2009). Recently, two items have been added to the CFC-future subscale to increase its reliability, resulting in a new CFC-14 scale (Joireman et al., 2012).

Although scores on the CFC-future and CFC-immediate subscales are often negatively correlated, this does not necessarily have to be the case. Additionally, it is important to note that CFC-future and CFC-immediate are both theoretically and empirically distinct concepts (Arnocky, Milfont, & Nicol, 2014). For example, CFC-immediate predicts both trait self-control (Joireman et al., 2008) and body mass index (Adams, 2012), whereas CFC-future does not. For more background on consideration of future consequences, we refer to Strathman et al. (1994) and Joireman, Strathman, and Balliet (2006).

2.2.4. Relations between time orientation measures

Research on the relations between different time orientation measures is limited. Therefore, Teuscher and Mitchell (2011) reviewed studies on discounting and time perspective as a way of establishing indirect evidence on the empirical relations between the two constructs. The authors conclude that discounting and time perspective are conceptually similar and have shared associations with a range of behaviors; yet the relationship does not seem to be strong. Charlton, Gossett, and Charlton (2011) employed an item-level analysis in order to gain a better understanding of discounting and its relation with the CFC scale. Results showed that discounting was mainly related to items about immediate decisions (and less to items about future decisions).

Even though only a few studies directly compare measures of time orientation, many studies employ two or more time orientation measures. A study by Daugherty and Brase (2010) showed that higher scores on ZTPI Future are related to less discounting, whereas higher scores on both ZTPI Present-Hedonistic and ZTPI Present-Fatalistic are related to more discounting. Similarly, higher scores on CFC-future are related to less discounting, whereas higher scores on CFC-immediate are related to more discounting (Joireman et al., 2008). Together, these studies indicate that individuals who are future-oriented and/or care about the future consequences of their behavior exhibit less discounting, whereas individuals who are present-oriented and/or care about the immediate consequences of their behavior exhibit more discounting. Generally, correlations between discount rates on the one hand and both the ZTPI and CFC scale on the other hand are small in size (for an overview, see Table 2.1, column 3).

Some studies employed both the ZTPI and CFC scale, but not all of them distinguished between the three most relevant ZTPI subscales (Future, Present-Hedonistic, and Present-Fatalistic) and between CFC-future and CFC-immediate. A recent study (Milfont & Schwarzenthal, 2014) showed that CFC-future was positively related to ZTPI Future and negatively related to ZTPI Present-Fatalistic, but not related to ZTPI Present-Hedonistic. CFC-immediate was positively related to both ZTPI Present-Hedonistic and ZTPI Present-Fatalistic and negatively related to ZTPI Future. As would be expected, these correlations indicate that future-oriented individuals care more about the future consequences and less about the immediate consequences of their behavior, whereas the opposite is true for present-oriented individuals. Generally, correlations between the ZTPI and CFC scale are moderate in size (for an overview, see Table 2.1, column 4).

Table 2.1. Overview of studies reporting correlations between discount rate, ZTPI, and CFC scale

Study	Measure	Discount rate	ZTPI
Adams & Nettle (2009)	ZTPI[a]	-.15	–
	CFC scale	-.21	.45
Bruderer Enzler (2015)	ZTPI	–	–
	CFC scale[b]	-.27–.23	–
Carmi (2013b)	ZTPI[a]	–	–
	CFC scale	–	.34
Charlton et al. (2011), Study 2	ZTPI	–	–
	CFC scale	-.23–.24	–
Crockett et al. (2009), Study 1	ZTPI[c]	–	–
	CFC scale	–	-.40–.38
Crockett et al. (2009), Study 2	ZTPI[b]	–	–
	CFC scale	–	-.45–.47
Dassen et al. (2015)	ZTPI	–	–
	CFC scale[d]	*ns*[e]	–
Daugherty & Brase (2010)	ZTPI[f]	-.13–.18	–
	CFC scale	.16	-.46–.44
Epstein et al. (2014)	ZTPI[a]	*not reported*	–
	CFC scale	*not reported*	.64
Johnson et al. (2010)	ZTPI	.29	–
	CFC scale	*ns*	*not reported*
Joireman et al. (2005), Study 2	ZTPI	–	–
	CFC scale	–	-.23
Keough et al. (1999), Study 2	ZTPI[g]	–	–
	CFC scale	–	-.42–.51
Milfont & Schwarzenthal (2014)	ZTPI	–	–
	CFC scale[d]	–	-.34–.47
Perry et al. (2015)	ZTPI[h]	–	–
	CFC scale	–	-.35–.45
Strathman et al. (1994), Study 2	ZTPI	–	–
	CFC scale	–	.36
Vásquez Echeverría et al. (2015)	ZTPI	–	–
	CFC scale	–	-.35–.52
Wininger & DeSena (2012)	ZTPI[a]	–	–
	CFC scale	–	.56
Worrell et al. (2015)	ZTPI[i]	–	–
	CFC scale	–	-.35–.44
Zhang et al. (2015), Study 2	ZTPI	–	–
	CFC scale	-.14–.11	–

Note. We do not claim that this table presents an exhaustive overview. Positive correlations indicate relations between similar (sub)scales (e.g., between ZTPI Future and CFC-future). Negative correlations indicate relations between dissimilar (sub)scales (e.g., between ZTPI Future and CFC-immediate). All correlations are significant at $p < .05$, unless otherwise indicated. ZTPI = Zimbardo Time Perspective Inventory; CFC = Consideration of Future Consequences.

[a]ZTPI Future; [b]9 items; [c]22 items; [d]14 items; [e]Behavior-specific versions of the discount rate (i.e., discount rate for snack food) and CFC scale (i.e., CFC-food) were also included; these measures were significantly correlated ($r = -.16$). [f]ZTPI Future, ZTPI Present-Hedonistic and ZTPI Present-Fatalistic; [g]21 items; [h]25 items; [i]15 items.

2.3. Domain differences in time orientation

An emerging issue in the time orientation literature is whether or not the construct is universal across domains (e.g., money, health) as well as various types of behavior within a domain (e.g., eating, exercising). Whereas it is already widely known that time orientation varies *between* individuals, a growing number of studies focuses on differences in time orientation *within* individuals. To illustrate this development, we first discuss studies on domain differences (mainly across domains) in discounting. Thereafter, we discuss studies on domain differences (mainly within domains) in time perspective and consideration of future consequences.

2.3.1. Domain differences in discounting

Domain differences in discounting can be assessed in various ways. One way is to estimate absolute differences in discount rates across domains (e.g., Hardisty & Weber, 2009). In doing so, it is possible to identify whether individuals have higher discount rates in one domain than in another (e.g., money versus health). This is referred to as the domain effect (Tsukayama & Duckworth, 2010). However, absolute differences between discount rates across domains do not mean that discounting in these domains is completely independent (Weatherly, Terrell, & Derenne, 2010). In order to assess whether discount rates are (in)dependent of each other, one has to identify how discount rates across domains vary in relation to each other. This is referred to as domain independence (Chapman, 1996). It is also possible to combine the two approaches by simultaneously determining absolute differences across domains and identifying correlations between discount rates across domains (Weatherly et al., 2010). The latter method was used by Lim and Bruce (2015) when they compared discount rates for money and weight-loss. First, they developed an adapted version of the Monetary Choice Questionnaire (Kirby et al., 1999) with weight-loss, instead of money, as a reward (Weight-loss Choice Questionnaire). Subsequently, they showed that the two discount rates were significantly different from each other and were moderately correlated. A third approach is to investigate domain-specificity, which means that an individual has a relatively high discount rate in one domain and a relatively low discount rate in another domain, as compared to other individuals (Tsukayama & Duckworth, 2010).

Studies on the domain effect have yielded mixed findings. For example, whereas most studies found higher discount rates for health than for money, some studies found the opposite or no difference at all (Chapman, 2003). Other studies have found that discount rates differ between some domains, but not between others. For example, Hardisty and Weber (2009) showed that discount rates for money and the environment did not differ from each other, but that the discount rate for health

differed from the discount rates for either money or the environment. Studies on domain (in)dependence have also resulted in mixed findings. Several studies have found that there is little or even no correlation between discount rates across the domains of money and health (Chapman, 1996; Fuchs, 1982; see also Jimura et al., 2011). However, similar to findings regarding the domain effect, it has been found that discounting is dependent for some domains, but independent for others. For example, one study found domain dependence between the domains of health and vacation (i.e., correlated discount rates), but domain independence between the domain of money on the one hand and the domains of health and vacation on the other hand (i.e., uncorrelated discount rates; Foxall, Doyle, Yani-de-Soriano, & Wells, 2011).

In addition to comparing discount rates in the domains discussed before, several studies have distinguished discount rates for primary, consumable rewards and monetary, non-consumable rewards. The majority of these studies showed that discount rates for primary rewards are higher than discount rates for monetary rewards (Charlton & Fantino, 2008; Odum, 2011; Reuben, Sapienza, & Zingales, 2010; Tsukayama & Duckworth, 2010). Nevertheless, several studies found positive relations between discount rates for primary and monetary rewards (Odum, 2011; Reuben et al., 2010; Tsukayama & Duckworth, 2010). Despite the similarity in results across these studies, researchers draw various conclusions from these findings. Tsukayama and Duckworth (2010) suggest that discounting is at least partly domain-general and that this could be explained by factors such as time perspective, domain-general decision rules and working memory capacity. Odum (2011) concludes that discounting is a trait variable (instead of a state variable), but qualifies this conclusion by stating that the trait character of discounting does not imply that discounting is unchangeable. In contrast, other researchers conclude that discounting is not a trait, but varies according to the discounting context or other domain-specific characteristics (Foxall et al., 2011; Weatherly & Terrell, 2011). All in all, it seems that although discounting has characteristics of a trait, it nevertheless varies according to the context or domain in which it is measured.

Yet another approach to establish domain differences is to present participants with a series of discounting scenarios and to derive domains, if any, from the responses. For example, Charlton and Fantino (2008) asked participants to respond to a series of discounting scenarios, including food, money, books, CDs, and DVDs. The results suggested that these commodities clustered into three groups, with food being discounted the most and money being discounted the least. Discount rates for books, CDs, and DVDs did not differ from each other and were in between the discount rates for food and money. Similarly, several studies by Weatherly and others (Weatherly & Terrell, 2011; Weatherly et al., 2010) showed that although some commodities are discounted similarly, at least two different domains of discounting exist. One of these

domains could be labeled as tangible and/or consumable (e.g., money, cigarettes), whereas the other domain could be labeled as non-tangible and/or non-consumable (e.g., body image, medical treatment; Weatherly & Terrell, 2011). This clustering of commodities into different domains indicates that the discount rate of a commodity within a particular domain can predict the discount rate of another commodity within the same domain, but cannot predict the discount rate of a commodity within a different domain. This implies that discount rates in different domains do not represent an individual's overall discount rate (Weatherly et al., 2010).

An advantage of this final method is that it does not use pre-defined domains. Pre-defining domains is not as straightforward as it might seem which becomes apparent from findings showing that correlations between discount rates vary greatly in strength within domains (Foxall et al., 2011). This is possibly due to the fact that even if a domain has a common denominator (e.g., health) it can still consist of fairly different behaviors (e.g., eating, smoking, and getting vaccinations). Thus, measuring a discount rate for the domain of health is based on the assumption that no differences exist between the various behaviors belonging to this domain. Research on domain differences in time perspective and consideration of future consequences, which we will discuss in the next section, shows that this assumption does not always hold true.

2.3.2. Domain differences in time perspective and consideration of future consequences

Only a few attempts at domain-specific measurement of time perspective and consideration of future consequences have been made. For example, several behavior-specific versions of the Time Perspective Questionnaire (TPQ) have been developed. The exercise version (TPQ-E; Hall, Fong, & Cheng, 2012) measures the extent to which individuals consider the long-term consequences of their current exercising behavior. Similarly, the diet version (TPQ-D; Hall et al., 2012) measures the extent to which individuals consider the long-term consequences of their current eating behavior. Both behavior-specific scales have shown better predictive capacity than the domain-general TPQ (Hall et al., 2012). For example, whereas the domain-general TPQ did not predict physical activity at all, the TPQ-E positively predicted physical activity (Hall & Epp, 2013). The scale has also been adapted to alcohol consumption (TPQ-A) and smoking (TPQ-S; Hall & Fong, 2013).

Behavior-specific versions of the Consideration of Future Consequences scale (CFC scale) have been developed for eating and exercising behavior (van Beek, Antonides, & Handgraaf, 2013). CFC-food and CFC-exercise have been adapted from the domain-general CFC scale in order to enable specific measurement of the extent to which individuals consider the present and future consequences of their current eating and exercising behavior. Empirical research confirmed that CFC-food and CFC-exercise

are different constructs (even though both belong to the health domain) and that these constructs differentially predict eating and exercising behavior (van Beek et al., 2013). One study has compared the predictive capacity of CFC-food to that of the domain-general CFC scale (Dassen, Houben, & Jansen, 2015). This study showed that CFC-food was not only correlated with healthy eating behavior (in contrast to the domain-general CFC scale which was not correlated with healthy eating behavior), but also predicted healthy eating behavior. No studies have yet compared the predictive capacity of CFC-exercise to that of the domain-general CFC scale. However, given the results of similar studies with the Time Perspective Questionnaire (Hall & Epp, 2013; Hall et al., 2012), it is expected that CFC-exercise outperforms the domain-general CFC scale in predicting exercising behavior.

2.4. Time orientation and health behavior

Several field studies show that choosing for the present or the future influences how healthy one's choices are. For example, a classic study showed that whereas half of the participants made an unhealthy snack choice in advance (i.e., one week before they would actually get the snack), more than 80% of the participants chose an unhealthy snack one week later (Read & van Leeuwen, 1998). Additionally, results showed that about 75% of the participants made a switch from a healthy snack in the advance choice to an unhealthy snack in the immediate choice. Also, it has been found that the longer in advance consumers order groceries in an online supermarket, the more healthy foods they buy (Milkman, Rogers, & Bazerman, 2010). These findings can probably be explained by an individual's time orientation. It is, however, important to realize that variations in time orientation will never account for all variation in health behavior. Individuals engage in health behavior for various reasons; the potential benefit on one's future health is just one of these (Adams & Nettle, 2009).

Although more and more studies on the relationship between time orientation and health behavior are being performed, results continue to be inconsistent. Generally, future orientation predicts healthy behavior (e.g., exercising), whereas present orientation predicts unhealthy behavior (e.g., smoking). However, individual studies differ greatly regarding the (combinations of) results being found. This could be partly due to the variety of samples used, the many ways in which time orientation is operationalized and measured as well as to the health behaviors that are studied. In this section, we first discuss studies that compare measures of time orientation when predicting a range of health behaviors. Thereafter, we discuss why the results of studies on the relationship between time orientation and health behavior are sometimes difficult to interpret.

2.4.1. Predictive capacity of time orientation measures

Only a few studies compared the predictive capacity of various measures of time orientation. In one study, time orientation was operationalized as discount rate, Consideration of Future Consequences scale (CFC scale), the Future subscale of the Zimbardo Time Perspective Inventory (ZTPI), subjective probability of living to age 75, and time period for financial planning (Adams & Nettle, 2009). When controlling for both demographic and personality characteristics, only scores on the CFC scale predicted smoking and body mass index. Higher CFC scores were associated with a lower probability of being a smoker and a lower body mass index. In fully controlled analyses, no measures of time orientation predicted the frequency of either moderate intensive or vigorous intensive physical activity. Scores on the CFC scale did, however, predict both types of physical activity in uncontrolled analyses, indicating that higher CFC scores are associated with higher frequency of physical activity. All in all, the CFC scale (as compared to the other four measures) showed the most consistent relations with various health behaviors (Adams & Nettle, 2009). In a similar study, discount rate, ZTPI Future, ZTPI Present-Hedonistic, ZTPI Present-Fatalistic, and the CFC scale were used to predict health behaviors varying from alcohol use to sunscreen use (Daugherty & Brase, 2010). Results showed that the five time orientation measures together improved the prediction of most health behaviors above and beyond demographic and personality characteristics. Additionally, it was found that ZTPI Future uniquely predicted most health behaviors, followed by ZTPI Present-Hedonistic, ZTPI Present-Fatalistic, the CFC scale, and the discount rate.

Although these two studies do not provide a definite answer to the question which measures have the best predictive capacity for health behavior, they do give some direction. Both studies indicate that questionnaires, such as the ZTPI and CFC scale, outperform discounting measures when predicting health behavior. This could imply that questionnaire measures are to be preferred over discounting measures. However, it should be noted that in both studies self-reported behavior was used. Thus, discounting was the only performance-based measure, which could partly explain the fact that discounting did predict behavior less well than the questionnaire measures.

2.4.2. Interpretation and measurement issues

Both time perspective and consideration of future consequences are related to a wide variety of behaviors (e.g., Joireman et al., 2006; Stolarski et al., 2015). Additionally, these constructs predict a range of health behaviors, including substance use (Keough, Zimbardo, & Boyd, 1999), drinking alcohol (Beenstock, Adams, & White, 2011), smoking (Adams, 2012; Adams & Nettle, 2009), preventive behavior (e.g., getting vaccinations and participation in screening, Crockett et al., 2009; Nan & Kim,

2014), body mass index (Adams, 2012; Adams & Nettle, 2009; Griva et al., 2015), healthy eating attitudes, intentions, and behavior (Dassen et al., 2015; Gick, 2014; Joireman et al., 2012; Mullan, Allom, Brogan, Kothe, & Todd, 2014; van Beek et al., 2013), exercising attitudes, intentions, and behavior (Adams & Nettle, 2009; Griva et al., 2015; Hall & Epp, 2013; Hall & Fong, 2003; Joireman et al., 2012; van Beek et al., 2013; Wininger & DeSena, 2012), and perceived health status (Griva et al., 2015).

Despite the increasing amount of literature, relations between time orientation and various health behaviors are still inconsistent and often difficult to interpret. This could be partly due to differences between, or even within, domains (see Section 2.3.2). Another reason could be that a variety of time orientation measures are used and that results often strongly depend on the measure being used (see Section 2.4.1). Additionally, even studies employing the same measure can be difficult to compare, because measures are being used inconsistently. For example, whereas some studies distinguish between CFC-future and CFC-immediate, still many studies do not yet make this distinction, which leads to inconclusive results. The use of one CFC score is problematic in two ways. First, a high CFC score could mean that an individual is highly concerned with future consequences, lacks concern with immediate consequences, or even both (Arnocky et al., 2014). Second, positive relations between CFC and behavior could indicate that individuals high in CFC-future are more likely to engage in a particular behavior, but also that individuals high in CFC-immediate are less likely to engage in a particular behavior (Arnocky et al., 2014; Joireman et al., 2012). These problems can be illustrated by two studies on CFC and body mass index (BMI). Adams and Nettle (2009) showed that higher CFC scores are negatively related to BMI, which seems to indicate that a stronger tendency to consider the future consequences of one's current behavior is related to a lower BMI. Adams (2012) showed that it is actually CFC-immediate (and not CFC-future) that is positively (instead of negatively) related to BMI. This indicates that a stronger tendency to consider the immediate consequences of one's current behavior is related to a higher BMI. Thus, in order to be able to understand the relations between CFC and behavior, it is essential to make an empirical distinction between CFC-future and CFC-immediate.

Another reason for clearly distinguishing between these two dimensions is that this enables investigations of the differential effects of present and future orientation. Whereas many previous studies mainly focused on future orientation, more and more studies now underline the importance of present orientation. For example, some studies show that present orientation is an even more important indicator for health behavior than future orientation (Crockett et al., 2009). Additionally, some studies have shown that CFC-future and CFC-immediate differentially predict behavior (Joireman et al., 2012; van Beek et al., 2013) or found only effects

of CFC-immediate and not of CFC-future (Adams, 2012). In this way, it became clear that sometimes differences in CFC-immediate (instead of CFC-future) are driving the relations between CFC and behavior. Therefore, it is also important to simultaneously investigate the effects of present and future orientation, in order to unravel the relative importance of both constructs. For example, a study showed that present fatalistic time perspective was a strong predictor of health behavior, when no other dimensions of time perspective were included in the model. However, when both future and present hedonistic time perspective were also included in the model, present fatalistic time perspective did not predict behavior, whereas future time perspective did (Henson, Carey, Carey, & Maisto, 2006). Finally, it is important to clearly distinguish and compare healthy and unhealthy behavior. For example, Henson et al. (2006) found that future time perspective was related to more protective and less risky health behavior, whereas present hedonistic time perspective was related to less protective and more risky health behavior. Similar differential effects could be found when comparing other healthy and unhealthy behaviors (e.g., consumption of vegetables vs. consumption of snacks).

2.5. Concluding remarks

Time orientation comprises a range of economic and psychological concepts which can be measured in multiple ways. Correlations between those measures are low or moderate on average (Table 2.1; see also Teuscher & Mitchell, 2011). Additionally, time orientation measures show highly varying correlations with health behavior. Generally, questionnaire measures seem to correlate with a broader range of behaviors than discounting measures. Also, differences across domains, and even within domains, have been found. Together, these findings undermine the idea that discounting future outcomes is a universal phenomenon. Instead, time orientation should be considered domain-specific or behavior-specific, and may also comprise various underlying dimensions (i.e., present vs. future).

One explanation for the low correlations between time orientation measures could be that both performance-based and self-report measures are being used, which may not be directly comparable. In addition, the differential success of time orientation measures in predicting behavior may be explained by a lack of compatibility between time orientation measures and the type of behavior. Whereas questionnaire measures are more compatible with self-reported behavior, discounting measures are more compatible with actual behavior. This could explain why measures such as the Zimbardo Time Perspective Inventory (ZTPI) and Consideration of Future Consequences scale (CFC scale) often outperform discounting measures. Still, time orientation measures also differ in their effectiveness in explaining different behaviors.

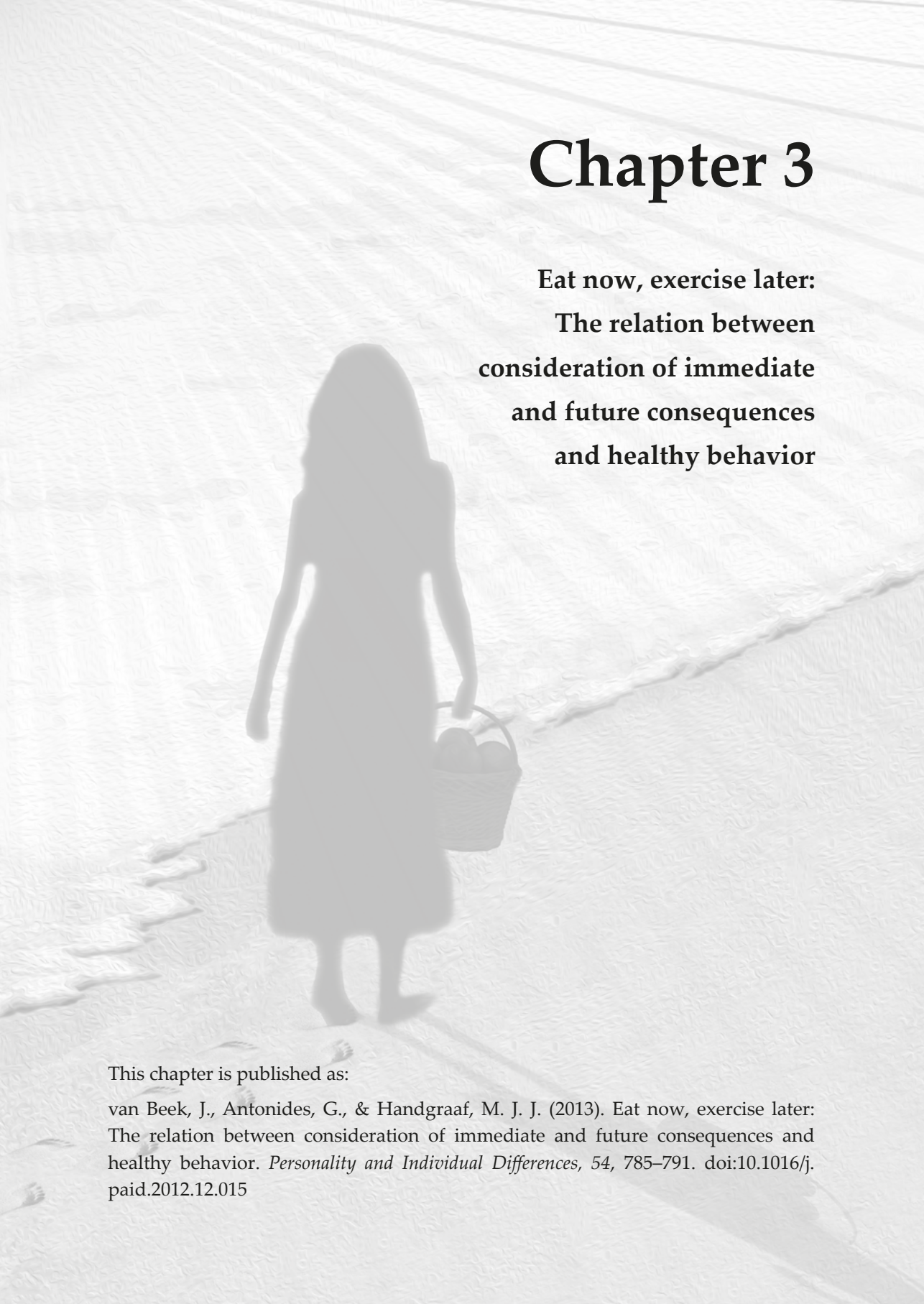
Enhancing the compatibility of the scales even more by developing behavior-specific scales that are in accordance with the behavior studied may further increase correlations between time orientation measures and behavior (see also Wininger & DeSena, 2012). In addition, the use of actual behavior would provide evidence on the suggestion that discounting measures outperform time orientation measures when predicting actual behavior. The lack of compatibility could also explain why differences across domains are found. For example, monetary discounting measures and saving behavior are more compatible than monetary discounting measures and health behavior. Therefore, discounting measures may be used more effectively to predict saving behavior than health behavior. All in all, measures that are highly compatible with the behavior that is being predicted seem to have the best predictive capacity.

Both discounting measures and time orientation measures have faced difficulties in dealing with intertemporal inconsistency. For discounting measures, this problem has been addressed by the use of hyperbolic discount functions; for time orientation measures, multidimensionality (i.e., present vs. future) has been assumed (see also Carmi, 2013b). Still, the weight of these dimensions in decision making depends on the timing of the outcomes (i.e., near vs. distant future) and the type of behavior to be explained. Another issue with the two types of measures is their interpretation. Both discounting and time orientation measures result in numerical outcomes. However, in contrast with discount rates, scores on time orientation measures have no economic interpretation, because the exact present value of a future outcome cannot be assessed.

All in all, even though research on time orientation and its relationship with health behavior can be improved in various ways, as we discussed in this chapter, this type of research provides promising avenues to improve our understanding of health behavior. Consequently, knowledge on the many ways in which the intertemporal character of health behavior influences individuals' choices and decisions can be used to promote healthy behavior.

Chapter 3

Eat now, exercise later: The relation between consideration of immediate and future consequences and healthy behavior



This chapter is published as:

van Beek, J., Antonides, G., & Handgraaf, M. J. J. (2013). Eat now, exercise later: The relation between consideration of immediate and future consequences and healthy behavior. *Personality and Individual Differences, 54*, 785–791. doi:10.1016/j.paid.2012.12.015

Abstract

In light of the current obesity epidemic, individual choices for food and exercise should be understood better. Consideration of the immediate and future consequences of these choices (i.e., time orientation) can be an important predictor of eating and exercising behavior. The objective was to show that behavior-specific time orientation differentially predicts eating and exercising behavior. Two studies were conducted among students (N = 55) and the general public (N = 165). Participants completed two adapted versions (for food and exercise) of the Consideration of Future Consequences (CFC) scale, each consisting of the subscales CFC-future and CFC-immediate. Thereafter they reported their eating and exercising behavior. Study 1 showed that CFC-food, but not CFC-exercise, predicted eating behavior. Similarly, both studies showed that CFC-exercise, but not CFC-food, predicted exercising behavior. Moreover, eating behavior was predicted by CFC-food/immediate, whereas exercising behavior was predicted by CFC-exercise/future. In conclusion, behavior-specific time orientation predicts behavior within a behavioral domain but less well across behavioral domains. Additionally, consideration of immediate and future consequences differentially predict behavior across behavioral domains. In order to predict behavior, time orientation is measured best at a behavior-specific level.

3.1. Introduction

Choices for food and exercise are made on a daily basis. Whereas some individuals consider the future consequences of these choices, others are more concerned with the immediate consequences. Is it true, however, that they do so regardless of the type of behavior? Or could it also be that for one behavior they consider the immediate consequences more, whereas for another behavior they consider the future consequences more? Insight into such differences is essential in order to predict and stimulate healthy eating and exercising behavior.

In Western societies, many people experience difficulties with eating healthily, being physically active and maintaining a healthy weight, which is reflected in the ever-increasing prevalence of overweight (Cutler, Glaeser, & Shapiro, 2003). Both eating and exercising behavior are determined by choices involving trade-offs between immediate outcomes (e.g., pleasure) and future outcomes (e.g., adverse health effects). Consideration of these trade-offs differs between individuals (Strathman, Gleicher, Boninger, & Edwards, 1994) and is referred to as *time orientation*. Consequently, time orientation provides a promising explanation of how people make choices for food and exercise.

Recent evidence indicates that a single individual's time orientation may differ across behaviors (e.g., financial vs. health behavior; Hardisty & Weber, 2009). In a similar vein, we investigate relations between time orientation and behavior in the behavioral domains of food and exercise. Furthermore, research indicates that immediate and future consequences differentially predict different types of financial behavior (Antonides & Nyhus, in preparation). Similarly, we investigate whether eating and exercising behavior are differentially predicted by consideration of immediate and future consequences.

3.1.1. Time orientation

Time orientation is extensively addressed in different literatures, ranging from time preference and temporal discounting (Frederick, Loewenstein, & O' Donoghue, 2002) in economics to time perspective (Zimbardo & Boyd, 1999) and consideration of future consequences (Joireman, Strathman, & Balliet, 2006) in psychology. We use *time orientation* as an overarching concept for these constructs and define this as a general orientation towards the present or the future. The concept includes, but is not limited to, the extent to which one considers the immediate and future consequences of one's current behavior. Generally, people tend to care more about the present and less about the future (Frederick et al., 2002), but individual differences exist. Whereas present-oriented individuals tend to focus on the immediate consequences of their behavior, future-oriented individuals are more concerned with the future consequences of their behavior (Strathman et al., 1994).

3.1.2. Time orientation across domains

Time orientation not only varies between but also within individuals. Differences across domains such as health, money, and the environment have been found (Hardisty & Weber, 2009). However, studies on domain-differences often reveal mixed and inconsistent results (Weatherly, Terrell, & Derenne, 2010). For example, whereas most studies found higher discount rates for health than for money, some studies found the opposite or no difference at all (Chapman, 2003).

One explanation for these mixed findings might be that domains are not well-defined (Foxall, Doyle, Yani-de-Soriano, & Wells, 2011). For example, measuring discount rates for health is based on the assumption "that delay discounting of health-related outcomes is itself unitary across different health issues" (Weatherly et al., 2010, p. 274). However, even though domains have a common denominator (e.g., health), they are actually multi-faceted categories consisting of fairly different behaviors (e.g., eating, smoking). We investigate, therefore, whether time orientation differs across two behavioral domains (food and exercise) within the broader domain of health, using behavior-specific adaptations of the Consideration of Future Consequences scale (CFC scale; Strathman et al., 1994).

3.1.3. Consideration of immediate and future consequences

The CFC scale (Strathman et al., 1994) is frequently used to measure individual differences in time orientation. Although there is not yet consensus about the scale's structure (Petrocelli, 2003; Rappange, Brouwer, & van Exel, 2009; Ryack, 2012), two subscales can be distinguished: CFC-future and CFC-immediate (Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008). CFC-future captures concern with future consequences (e.g., achieving future outcomes), whereas CFC-immediate captures concern with immediate consequences (e.g., satisfying immediate concerns). It should be noted, however, that CFC-future and CFC-immediate are not necessarily negatively correlated.

CFC-future and CFC-immediate are empirically distinguishable. For example, CFC-immediate predicts trait self-control (Joireman et al., 2008) and body mass index (BMI; Adams, 2012), whereas CFC-future does not. Moreover, CFC-immediate predicts short-term financial behavior (e.g., making ends meet), whereas CFC-future predicts long-term financial behavior (e.g., saving; Antonides & Nyhus, in preparation). Following these studies, we investigate whether eating and exercising behavior are differentially predicted by CFC-future and CFC-immediate. By doing so, we respond to a call for research into the unique contributions of CFC-future and CFC-immediate (Joireman et al., 2008).

3.1.4. Study overview

The first objective (Studies 1 and 2) was to investigate whether behavior-specific time orientation (i.e., CFC-food and CFC-exercise) predicts behavior within and across the behavioral domains of food and exercise. We hypothesize that CFC-food predicts eating behavior, but exercising behavior less well (H1a) and that CFC-exercise predicts exercising behavior, but eating behavior less well (H1b). The second objective (Studies 1 and 2) was to investigate whether consideration of immediate and future consequences differentially predict eating and exercising behavior. The third objective (Study 2) was to show the existence of behavior-specific time orientation and its dimensions. We hypothesize that CFC-food and CFC-exercise are different, yet related, constructs (H3a); each consisting of CFC-future and CFC-immediate (H3b). To test our hypotheses, we created adapted scales, but the scale adaptation part, although we consider it useful and important, is not the main focus of this chapter.

3.2. Study 1

3.2.1. Method

3.2.1.1. Participants

Fifty-five Wageningen University students (21 male, 34 female) with a mean age of 21.29 (*SD* = 2.25) years participated.

3.2.1.2. Procedure

Students of four undergraduate courses in Social Sciences were asked to complete a paper and pencil questionnaire consisting of two parts. The first part consisted of CFC-food and CFC-exercise in counterbalanced order. The second part consisted of self-reported eating and exercising behavior, and demographics. All questions (in both studies) were answered on a 7-point Likert scale (ranging from 1 = *disagree* to 7 = *agree*). The questionnaire was administered in English and could be completed in 15 minutes. Participants did not receive any compensation.

3.2.1.3. Measures

3.2.1.3.1. CFC-food and CFC-exercise

The CFC scale (Strathman et al., 1994) contains 12 items and has two subscales, CFC-future (five items) and CFC-immediate (seven items; Joireman et al., 2008). Higher scores on CFC-future indicate more consideration of future consequences, whereas higher scores on CFC-immediate indicate more consideration of immediate

consequences. For calculation of full scale scores, CFC-immediate items were reverse-coded. Therefore, higher scores on the full scale indicate more consideration of future consequences. CFC-food and CFC-exercise were created by incorporating the words *food* or *eating behavior*, respectively *physical activity* or *physical activity pattern* in all items. All items of CFC-food and CFC-exercise are provided in Appendix 3.1.

3.2.1.3.2. Self-reported eating and exercising behavior

Self-reported eating and exercising behavior were measured with the statements "In general, I eat healthy" and "In general, my physical activity is sufficient."

3.2.2. Results

Descriptive statistics for CFC-food and CFC-exercise are given in Table 3.1. No main or interaction effects of question order were found. Therefore, order was not included in the analyses.

Table 3.1. Descriptive statistics for CFC-food, CFC-exercise, and CFC-general (Studies 1 and 2)

	Study 1			Study 2		
	M	*SD*	α	*M*	*SD*	α
CFC-food	4.54	0.76	.83	4.72	0.88	.81
CFC-food/future	4.68	0.86	.66	4.86	0.93	.66
CFC-food/immediate	3.56	0.88	.81	3.38	1.11	.82
CFC-exercise	4.47	0.77	.84	4.54	0.86	.79
CFC-exercise/future	4.65	0.88	.70	4.69	0.92	.62
CFC-exercise/immediate	3.66	0.94	.87	3.57	1.11	.82
CFC-general[a]				4.65	1.20	.76
CFC-general/future[b]				4.56	1.38	.67
CFC-general/immediate[b]				3.27	1.38	.71

Note. $N = 55$ (Study 1) and 165 (Study 2).
[a]Four items. [b]Two items.

Two multiple regression analyses were performed with either eating or exercising behavior as dependent variable and both CFC-food and CFC-exercise as predictors. It was found that CFC-food, but not CFC-exercise, predicts eating behavior (H1a). Similarly, it was found that CFC-exercise, but not CFC-food, predicts exercising behavior (H1b; Table 3.2). Both relations are positive, indicating that participants who focus more on the future consequences of their eating and exercising behavior report more healthy eating and exercising behavior. These analyses were repeated with CFC-food/future, CFC-food/immediate, CFC-exercise/future, and CFC-exercise/immediate as predictors. For eating behavior, the only predictor is CFC-food/immediate, whereas for exercising behavior, the only predictor is CFC-exercise/future (Table 3.3). The positive relation between CFC-exercise/future and exercising

behavior indicates that focusing on the future consequences of exercising behavior is related to more exercising behavior, whereas the negative relation between CFC-food/immediate and eating behavior indicates that focusing on the immediate consequences of eating behavior is related to less healthy eating behavior.

Table 3.2. Regression analyses of CFC-food and CFC-exercise on self-reported eating and exercising behavior (Study 1)

	Eating behavior			Exercising behavior		
	B	*t*	*p*	*B*	*t*	*p*
Constant	2.196	2.867	.006	0.054	0.047	.963
CFC-food	0.764	3.580	.001	-0.289	-0.916	.364
CFC-exercise	-0.088	-0.414	.681	1.345	4.336	.000
Adjusted R^2	.258			.317		

Note. $N = 55$.

Table 3.3. Regression analyses of the future and immediate subscales of CFC-food and CFC-exercise on self-reported eating and exercising behavior (Study 1)

	Eating behavior			Exercising behavior		
	B	*t*	*p*	*B*	*t*	*p*
Constant	6.530	5.367	.000	1.725	1.005	.320
CFC-food/future	0.067	0.351	.727	-0.250	-0.909	.368
CFC-food/immediate	-0.694	-3.315	.002	0.031	0.107	.915
CFC-exercise/future	0.061	0.355	.724	1.125	4.656	.000
CFC-exercise/immediate	0.168	0.920	.362	-0.312	-1.226	.226
Adjusted R^2	.260			.391		

Note. $N = 55$.

3.2.3. Discussion

As expected, behavior-specific time orientation predicts self-reported behavior within a behavioral domain but not across behavioral domains. Moreover, CFC-future and CFC-immediate differentially predict self-reported behavior across behavioral domains. Surprisingly, eating behavior is predicted by CFC-immediate, but not by CFC-future, whereas exactly the opposite pattern of results appears for exercising behavior, which is predicted by CFC-future and not by CFC-immediate.

A limitation of Study 1 is that it was impossible to investigate the factor structure of CFC-food and CFC-exercise. In Study 2, we employed a larger sample size to be able to test whether CFC-food and CFC-exercise are actually different constructs. Another limitation is that self-reported eating and exercising behavior were both measured with a single item. We addressed this limitation in Study 2 by using multi-item measures.

3.3. Study 2

3.3.1. Method

3.3.1.1. Participants

One hundred seventy-three train passengers participated in exchange for a small reward (apple or candy bar). Six participants were excluded because they did not complete one or more pages of the paper and pencil questionnaire. One participant was excluded because his child completed the questionnaire. The final sample consisted of 165 participants (67 male, 98 female) with a mean age of 41.38 (*SD* = 18.71) years.

3.3.1.2. Procedure

The study was conducted on the train on two weekdays. Passengers who agreed to participate were left alone to complete the questionnaire which existed of four parts, labeled "food," "exercise," "the future," and "personal details." The part about food consisted of CFC-food and questions on eating behavior, whereas the part about exercise consisted of CFC-exercise and questions on exercising behavior. The order of these parts was counterbalanced. Thus, in contrast with Study 1 in which the order was based on type of measure, the order was based on behavioral domain. The part about the future consisted of four items of the original CFC scale. The questionnaire was administered in Dutch and could be completed in 15 minutes. Approximately 339 passengers were approached of which 51% agreed to participate.

3.3.1.3. Measures

3.3.1.3.1. CFC-food and CFC-exercise

The Dutch translation of the CFC scale was used and adapted as in Study 1 to create CFC-food and CFC-exercise (see Appendix 3.1).

3.3.1.3.2. CFC-general

Four items (items 1, 2, 10, and 11) of the original CFC scale were included. These items had the highest factor loadings on CFC-future, respectively CFC-immediate in a previous study (Antonides & Nyhus, in preparation).

3.3.1.3.3. Self-reported eating and exercising behavior

Participants answered three questions about both eating and exercising behavior. Next to the questions of Study 1, participants indicated the number of days a week they (a) eat at least two servings of fruit a day, (b) eat at least 200 grams of vegetables a day, (c) are physically active for at least 30 minutes a day, and (d) exercise. These questions were based on generally accepted guidelines of the Dutch Nutrition Centre and the Dutch Institute for Exercise and Physical Activity.

3.3.2. Results

Descriptive statistics for CFC-food, CFC-exercise, and CFC-general are given in Table 3.1. Both CFC-food and CFC-exercise correlate positively with CFC-general (Table 3.4) and have comparable reliability (Table 3.1). This holds for the full scales as well as CFC-future and CFC-immediate. No main or interaction effects of question order were found. Therefore, order was not included in the analyses.

Table 3.4. Correlations of CFC-food and CFC-exercise with CFC-general (Study 2)

	1	2	3	4	5	6	7	8	9
1. CFC-food	–								
2. CFC-food/future	.738***	–							
3. CFC-food/immediate	-.915***	-.404***	–						
4. CFC-exercise	.725***	.548***	-.656***	–					
5. CFC-exercise/future	.437***	.555***	-.261**	.714***	–				
6. CFC-exercise/immediate	-.707***	-.403***	.718***	-.911***	-.363***	–			
7. CFC-general[a]	.618***	.556***	-.506***	.549***	.516***	-.428***	–		
8. CFC-general/future[b]	.456***	.510***	-.314***	.402***	.534***	-.222**	.869***	–	
9. CFC-general/immediate[b]	-.618***	-.458***	.565***	-.552***	-.363***	.521***	-.869***	-.511***	–

Note. $N = 165$.
[a]Four items. [b]Two items.
**$p < .01$. ***$p < .001$.

3.3.2.1. Confirmatory factor analyses

LISREL was used to analyze covariance matrices with maximum likelihood estimation. First, we analyzed CFC-food and CFC-exercise separately (Table 3.5) and compared one-factor models of food (model 1a) and exercise (model 1b) with two-factor models of food (model 2a) and exercise (model 2b). For both food, $\chi^2(1) = 45.230$, $p < .001$, and exercise, $\chi^2(1) = 43.602$, $p < .001$, the two-factor model provided a statistically better fit than the one-factor model (Table 3.6), indicating that both CFC-food and CFC-exercise consist of CFC-future and CFC-immediate.

Second, we analyzed CFC-food and CFC-exercise together (Table 3.5) and compared a one-factor model (model 3), two two-factor models (models 4 and 5) and a four-factor model (model 6). The four-factor model (model 6) had a statistically better fit than the one-factor model (model 3), $\chi^2(6) = 253.308$, $p < .001$, and both two-factor models, $\chi^2(5) = 191.508$, $p < .001$ (model 4) and, $\chi^2(5) = 89.391$, $p < .001$ (model 5, Table 3.6). This shows that CFC-food and CFC-exercise are different, yet related, constructs (H3a); each consisting of CFC-future and CFC-immediate (H3b).

Table 3.5. Overview of confirmatory factor analysis models (Study 2)

	Factors	Labels	Items
Model 1a	1	CFC-food	12
Model 1b	1	CFC-exercise	12
Model 2a	2	CFC-food/future	5
		CFC-food/immediate	7
Model 2b	2	CFC-exercise/future	5
		CFC-exercise/immediate	7
Model 3	1	CFC	24
Model 4	2	CFC-food	12
		CFC-exercise	12
Model 5	2	CFC-future	10
		CFC-immediate	14
Model 6	4	CFC-food/future	5
		CFC-food/immediate	7
		CFC-exercise/future	5
		CFC-exercise/immediate	7

3.3.2.2. Structural equation models

Two models were developed by extending the four-factor model with factors for eating and exercising behavior. In the first model (model 7), all relations between CFC-factors and behavior-factors were allowed. In the second model (model 8), only congruent relations between factors (i.e., from CFC-food to eating behavior and from CFC-exercise to exercising behavior) were allowed. The fit of the full model was statistically better than the fit of the restricted model as indicated by the chi-square difference test, $\chi^2(4) = 32.789$, $p < .001$. The other fit indices showed marginal differences between the models, all of which were in favor of model 7 (Table 3.6). As in Study 1, there were significant relations between CFC-food/immediate and eating behavior and between CFC-exercise/future and exercising behavior (Figure 3.1). Again, participants who focus more on the immediate consequences of their eating behavior report less healthy eating behavior, whereas participants who focus more on the future consequences of their exercising behavior report more exercising behavior. In addition, there was a significant relation between CFC-exercise/future and eating behavior, indicating that participants who focus on the future consequences of their exercising behavior not only report more exercising behavior but also report more healthy eating behavior.

3.3.3. Discussion

Study 2 replicates Study 1, but also shows that time orientation in one behavioral domain may predict self-reported behavior in another behavioral domain. In particular, time orientation in the exercise domain predicted eating behavior, whereas time orientation in the food domain did not predict exercising behavior.

Table 3.6. Fit indices for confirmatory factor analysis models and structural equation models (Study 2)

	χ^{2ab}	χ^2/df[b]	RMSEA[b]	SRMR[b]	GFI[c]	NNFI[c]	AIC[b]
Model 1a	186.179	3.448	.122	.089	.841	.863	234.179
Model 1b	164.667	3.050	.112	.090	.857	.870	212.677
Model 2a	140.949	2.659	.101	.079	.875	.896	190.949
Model 2b	121.075	2.284	.088	.081	.890	.910	171.075
Model 3	881.930	3.500	.123	.100	.691	.849	977.930
Model 4	820.130	3.267	.118	.100	.706	.864	918.130
Model 5	718.013	2.861	.107	.093	.733	.876	816.013
Model 6	628.622	2.555	.097	.091	.758	.892	736.622
Model 7	855.732	2.189	.085	.090	.742	.891	1003.732
Model 8	888.521	2.249	.087	.090	.735	.889	1028.521

Note. χ^2 = Normal Theory Weighted Least Squares Chi-Square; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; GFI = Goodness-of-Fit Index; NNFI = Non-Normed Fit Index; AIC = Akaike Information Criterion.

[a]All χ^2s were significant at $p < .001$. [b]Lower values indicate better fit. [c]Higher values indicate better fit.

3.4. General discussion

Rather than establishing absolute differences in time orientation, we investigated, analogous to the double dissociation methodology, whether time orientation for food and exercise differentially predict eating and exercising behavior. Both studies showed that time orientation in the food domain predicted eating behavior, but did not predict exercising behavior. Alternatively, time orientation in the exercise domain predicted exercising behavior, but predicted eating behavior less well. Whereas several studies found that time orientation is domain-specific (Hardisty & Weber, 2009; Weatherly et al., 2010), we show that time orientation for food and for exercise are different constructs, although they both belong to the health domain. Regardless of the positive correlation between the two constructs, these findings indicate that time orientation is not uniform within a domain.

These results provide an explanation for the inconsistent domain-differences in time orientation (Chapman, 2003; Weatherly et al., 2010). Perhaps more important than investigating differences between domains and defining what exactly constitutes a domain (Foxall et al., 2011) is accounting for differences *within* domains. Because domains (e.g., health, money) encompass many different types of behavior, the mixed findings probably stem from choices researchers make regarding the specific behaviors under scrutiny. We show that type of behavior is a very important indicator, possibly more important than the broader domain to which a behavior belongs.

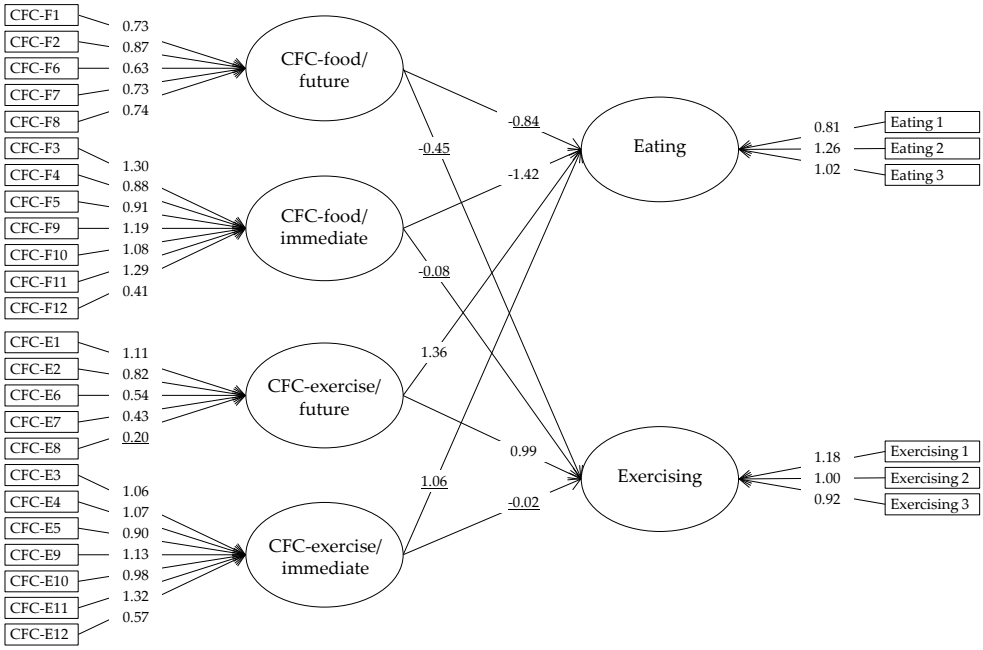


Figure 3.1. Structural equation model of the relations between consideration of immediate and future consequences and self-reported eating and exercising behavior (Study 2). Non-significant coefficients are underscored.

Consistent with earlier studies (Adams, 2012), focusing on future consequences was related to *more* healthy behavior, whereas focusing on immediate consequences was related to *less* healthy behavior. Additionally, we showed that eating behavior was predicted by consideration of *immediate* consequences, whereas exercising behavior was predicted by consideration of *future* consequences. These findings confirm the distinction between CFC-future and CFC-immediate (Antonides & Nyhus, in preparation; Joireman et al., 2008). Recently, Joireman, Shaffer, Balliet, and Strathman (2012) investigated relations between consideration of immediate and future consequences and healthy eating and exercising attitudes. They found that both eating and exercising attitudes were predicted by consideration of future consequences, but not by consideration of immediate consequences, which contrasts our findings. The difference may be caused by three dissimilarities between their and our studies. First, they used the original CFC scale instead of domain-specific scales. Second, they added two items to CFC-future, thereby changing the scale's psychometric characteristics. Finally, they measured attitudes, whereas we measured self-reported behavior. Our findings indicate, however, that using specific scales for food and exercise allows for further specification of the predictive value of consideration of immediate and future consequences across domains.

A possible explanation for our findings could be that eating and exercising behavior involve different self-regulation processes. Given the relation between CFC-immediate and self-control (Joireman et al., 2008) and the fact that eating behavior is only predicted by CFC-immediate, we suggest that eating behavior mainly involves short-term self-control. For exercising behavior, however, other processes such as long-term planning are probably more important. Exercising involves choices between exercising or not, whereas eating involves choices between, for example, eating healthy or unhealthy food. Consequently, self-control is relatively more important for eating behavior (e.g., resisting the temptation of eating chocolate), whereas planning is relatively more important for exercising behavior (e.g., planning to go jogging twice a week).

We measured time orientation at a behavior-specific level, an approach that to our knowledge has not been used before but appears to be successful. This, however, does not imply that specification of time orientation should take place to infinity. It is inefficient to measure time orientation at the level of single behaviors, because this requires multiple time orientation measures (which is burdensome for participants) and, in this case, it is easier to directly measure behavior. In order to predict specific behaviors, the level of behavioral domains is probably as specific as necessary, yet not too specific.

One limitation of the present studies is that we are not able to explain why, in Study 2, consideration of the future consequences of exercising behavior does not only predict exercising behavior but also eating behavior. A possible explanation might be that eating and exercising behavior are related, but for lack of identification, it was impossible to capture this relation in models 7 and 8. Another limitation is that it is unclear what participants have in mind when they think about, for example, the future consequences of their eating behavior. Do they think about positive or negative consequences? Do they think about healthy or unhealthy behavior? Future studies might investigate these different possibilities more closely. Furthermore, we used the 12-item CFC, whereas an improved 14-item scale is now available (Joireman et al., 2012). Finally, only self-reported behavior was measured. Even though we believe that this adequately reflects actual behavior, future studies might investigate whether our results generalize to actual behavior. It would also be useful to include relations and trade-offs between eating and exercising behavior in future studies.

Our findings also open up avenues for research into the roles of self-control and planning as two distinct determinants of different types of health behavior. Future studies could more specifically relate self-control and planning to eating and exercising behavior, so as to increase our understanding of the role of different self-regulatory processes in healthy behavior. Investigating how goals for action and inaction (Hepler, Albarracin, McCulloch, & Noguchi, 2012) or differences between temptations and goals (Fishbach & Zhang, 2008) are linked to time orientation and healthy behavior would further advance our understanding of these relations.

3.5. Conclusion

Overall, time orientation for food and for exercise are different constructs that differentially predict eating and exercising behavior. In order to predict behavior, therefore, time orientation is measured best at a behavior-specific level. Additionally, both immediate and future consequences should be taken into account, because these two dimensions of time orientation predict different types of behavior. These insights might successfully be used in order to stimulate healthy eating and exercising behavior.

Acknowledgements

The authors would like to thank Vera Wiedemann for her assistance with the data collection of Study 2.

Appendix 3.1. CFC-food and CFC-exercise

CFC-food and CFC-exercise are adapted versions of the Consideration of Future Consequences scale (Strathman et al., 1994). The domain-specific part of each item is shown in italics and CFC-exercise is shown between brackets.

1. I consider how my health might be in the future, and try to influence my health with my day to day *eating behavior (physical activity pattern)*.
2. Often I engage in a particular *eating behavior (physical activity pattern)* in order to achieve outcomes that may not result for many years.
3. I only choose my *food (physical activity)* to satisfy immediate needs, figuring the future will take care of itself.
4. My *eating behavior (physical activity pattern)* is only influenced by the immediate (i.e., a matter of days or weeks) consequences of my actions.
5. My convenience is a big factor in the *food (physical activity)* I choose or my *eating behavior (physical activity pattern)*.
6. I am willing to sacrifice the immediate happiness or well-being I derive from my *eating behavior (physical activity pattern)* in order to achieve future outcomes.
7. I think it is important to take warnings about negative consequences of my *eating behavior (physical activity pattern)* seriously even if the negative consequence will not occur for many years.
8. I think it is more important to perform *eating behavior (physical activity)* with favorable distant consequences than *eating behavior (physical activity)* with less favorable immediate consequences.
9. I generally ignore warnings about possible future consequences of my *eating behavior (physical activity pattern)* because I think they will be resolved before they reach crisis level.
10. I think that sacrificing particular *food (physical activity)* now is usually unnecessary because future outcomes can be dealt with at a later time.
11. I only choose my *food (physical activity)* to satisfy immediate needs, figuring that I will take care of future problems that may occur at a later date.
12. Because my day to day *eating behavior (physical activity pattern)* has specific consequences, it is more important to me than behavior that has distant consequences.

Chapter 4

Time orientation and construal level: Effects on eating and exercising behavior and preferences

This chapter is in press as:

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (in press-a). Time orientation and construal level: Effects on eating and exercising behavior and preferences. *International Journal of Consumer Studies*.

Abstract

Eating and exercising behavior are both characterized by immediate and future consequences. Consequently, consideration of these consequences (i.e., time orientation) predicts eating and exercising behavior. We investigate whether construal level acts as an underlying mechanism of these relations. Students (N = 101) completed measures of consideration of immediate and future consequences (i.e., CFC-food and CFC-exercise), construal level, eating and exercising behavior and preferences. For self-reported eating and exercising behavior, only direct effects of consideration of immediate and future consequences were found. For eating preferences, however, there was evidence of an indirect effect through construal level. A stronger tendency to consider future consequences led to a stronger preference for utilitarian (as compared to hedonic) food products through a more abstract construal level. All in all, construal level partially explains the differential relations between consideration of immediate and future consequences and eating and exercising behavior and preferences.

4.1. Introduction

One determinant of healthy behavior is the extent to which individuals care about the future. Both eating and exercising behavior often involve trade-offs between present and future consequences. Every time individuals are faced with choices between healthy and unhealthy food or between being active and being inactive, trade-offs between various consequences, such as immediate enjoyment and future health benefits, are made. Consequently, present-oriented and future-oriented individuals are likely to make different choices. We aim to get more insight into the relations between time orientation and healthy behavior by investigating potential underlying mechanisms. We propose construal level, the extent to which one thinks abstractly or concretely, as a mechanism through which individual differences in time orientation affect eating and exercising behavior. Investigating relations between consideration of future consequences and construal level is a promising way of improving our understanding of decision-making processes involving temporal trade-offs (Joireman, Strathman, & Balliet, 2006).

4.1.1. Time orientation and consideration of future consequences

Time orientation, which we define as a general orientation towards the present or the future, can be conceptualized in various ways (van Beek, Handgraaf, & Antonides, in press-b). In contrast to other fairly general concepts, consideration of future consequences (CFC) covers one specific aspect of time orientation and reflects "the extent to which people consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes" (Strathman, Gleicher, Boninger, & Edwards, 1994, p. 743). CFC is usually measured with the Consideration of Future Consequences scale (CFC scale; Strathman et al., 1994). The CFC scale was developed as a one-dimensional measure, but later studies showed that the scale actually covers a two-dimensional construct (e.g., Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008; Joireman, Shaffer, Balliet, & Strathman, 2012; but see for example Hevey et al. (2010) and McKay, Cole, & Percy (2015) for different factor solutions). One dimension reflects consideration of future consequences (labeled CFC-future), whereas the other one in fact reflects consideration of immediate consequences (labeled CFC-immediate). It is important to note that CFC-future and CFC-immediate are not only theoretically, but also empirically distinct concepts (Arnocky, Milfont, & Nicol, 2014).

4.1.2. CFC and eating and exercising behavior

As compared to several other measures of time orientation, CFC shows the most consistent relations with health behavior (Adams & Nettle, 2009). For example,

future-oriented individuals have stronger healthy eating intentions, exercise more frequently, and have a lower body mass index, whereas present-oriented individuals have weaker healthy eating intentions, have a higher body mass index, and are more likely to smoke (Adams, 2012; Adams & Nettle, 2009; Gick, 2014). Recently, studies have specifically investigated relations between consideration of future as well as immediate consequences and both eating and exercising attitudes, intentions, and self-reported behavior. One study showed that CFC-future was positively related to healthy eating and exercising attitudes as well as intentions, whereas CFC-immediate was not related to any of the dependent variables (Joireman et al., 2012). Van Beek, Antonides, and Handgraaf (2013) developed adapted versions of the CFC scale for food and exercise (labeled CFC-food and CFC-exercise) and investigated whether these constructs differentially predict self-reported eating and exercising behavior. Results showed that eating behavior was predicted by CFC-food/immediate, but not by CFC-food/future, whereas exactly the opposite pattern of results appeared for exercising behavior, which was predicted by CFC-exercise/future, but not by CFC-exercise/immediate. Additionally, it has been found that young adults do consider the immediate, but not the future, consequences of their food consumption (Fisher, Erasmus, & Viljoen, 2016). Another study, however, found that both CFC-food subscales predicted eating behavior, such that CFC-food/future predicted more healthy eating behavior and CFC-food/immediate predicted less healthy eating behavior (Dassen, Houben, & Jansen, 2015). However, the effect on eating behavior was stronger for CFC-food/immediate than for CFC-food/future, which still contradicts Joireman et al. (2012), but is to some extent in line with van Beek et al. (2013). Thus, evidence on the relations between CFC-future and CFC-immediate on the one hand and eating and exercising behavior on the other hand is mixed. In order to get more insight into these relations, we take a closer look into potential mechanisms from which these relations might emerge.

4.1.3. CFC and construal level

One construct through which consideration of immediate and future consequences might affect behavior is construal level (Joireman et al., 2006). Construal level theory states that actions or events can be represented at two levels. A high-level construal is an abstract representation (e.g., "gaining knowledge") of an action (e.g., "reading"), whereas a low-level construal is a concrete representation (e.g., "following lines of print") of that same action. An important aspect of construal level theory is the notion of psychological distance, which can be temporal, spatial, social, or hypothetical (Trope & Liberman, 2003, 2010). Specifically, psychological distance towards an event affects its perceived level of construal. Thus, temporally close events are likely to elicit concrete construals, whereas temporally distant events are likely to elicit

abstract construals. For example, giving a talk tomorrow elicits thoughts about the lay-out of the slides, whereas giving a talk next month elicits thoughts about the general message one wants to get across. Applying this line of reasoning to CFC (instead of temporal distance) has resulted in the suggestion that "by directing attention to either the immediate or delayed consequences of one's actions, CFC influences the way individuals construe their behavioral options" (Joireman et al., 2006, p. 90). Consequently, considering the future consequences of one's actions is most likely associated with a higher, abstract level of construal, whereas considering the immediate consequences of one's actions is most likely associated with a lower, concrete level of construal. CFC and construal level are, however, partly independent in the sense that both future and immediate consequences can be construed either abstractly or concretely (Fujita, Eyal, Chaiken, Trope, & Liberman, 2008). Nevertheless, individuals who primarily focus on future consequences would be more likely to evaluate alternatives based on abstract, high-level aspects, whereas individuals who primarily focus on immediate consequences would be more likely to evaluate alternatives based on concrete, low-level aspects (Joireman et al., 2006, Joireman et al., 2012). Individuals could also focus on both future and immediate consequences or neglect both future and immediate consequences. How such combinations would be related to construal level is an open question.

4.1.4. Construal level as an underlying mechanism

Based on the suggested relation between CFC and construal level, we expect that construal level is a potential mechanism through which consideration of future and immediate consequences affect eating and exercising behavior. Specifically, individuals who score high on consideration of future consequences would also score high on construal level, whereas individuals who score high on consideration of immediate consequences would score low on construal level. To gain insight into how this in turn affects eating and exercising behavior, we measure eating and exercising at two levels matching individuals' levels of construal. Specifically, we distinguish between eating and exercising at a general level (matching a high construal level) and at a specific level (matching a low construal level). Eating and exercising may be measured at a general level by asking participants to indicate how healthy they eat or how frequently they exercise in general (labeled eating and exercising behavior). Eating and exercising could also be measured at a much more specific level by asking participants which type of food or exercise they prefer (labeled eating and exercising preferences). For example, one study on construal level in which a measure of eating behavior was included asked participants to make a choice between an apple and a candy bar (Fujita & Han, 2009). We expect that individuals who score high on both consideration of future consequences and construal level would be more inclined to

report healthy behavior or choose healthy options, whereas individuals who score high on consideration of immediate consequences and low on construal level would be more inclined to report unhealthy behavior or choose unhealthy options. We expect that these effects are strongest when the level at which eating and exercising are measured matches individuals' level of construal.

All in all, the aim of this study is to shed more light on the relations between time orientation and eating and exercising behavior as well as their underlying mechanisms. We do this by (a) distinguishing between consideration of future consequences and consideration of immediate consequences, (b) investigating construal level as a potential underlying mechanism, and (c) measuring eating and exercising at both general and specific levels (i.e., behavior and preferences).

4.2. Method

4.2.1. Participants

In total, 107 students of Wageningen University participated. Six participants were excluded because of software problems (N = 4) or non-compliance with the instructions (N = 2). The final sample consisted of 101 participants (44 male, 57 female) with a mean age of 21.36 (SD = 2.15) years.

4.2.2. Procedure

Participants were recruited on campus by means of flyers. Upon arrival in a computer room, participants were seated and instructed to follow the instructions on the computer screen. After giving informed consent, participants started with completing the CFC-food scale and questions about general eating behavior, followed by part one of a filler task, consisting of five multiple choice general knowledge questions. Next, they completed the CFC-exercise scale and questions about general exercising behavior, followed by another five multiple choice questions. Then, they completed a construal level measure and the final five multiple choice questions. In the next part of the study, participants rated food products and physical activities on a number of aspects and subsequently indicated their preferred product/activity in a series of product pairs and activity pairs as a measure of eating and exercising preferences. Afterwards, they completed questions on demographic characteristics. Participants completed the full study in either of two orders, food–exercise or exercise–food. Finally, participants were thanked and could choose a reward (either chocolate or a LED flashlight). The study could be completed in 25 minutes.

4.2.3. Measures

4.2.3.1. CFC-food and CFC-exercise

CFC-food and CFC-exercise are adapted versions of the CFC-14 scale (Joireman et al., 2012) and were created by incorporating the words *food* or *eating behavior*, respectively *physical activity* or *physical activity pattern* in all items (see van Beek et al., 2013 and Appendix 4.1). Both CFC-food and CFC-exercise consist of CFC-future (seven items) and CFC-immediate (seven items) subscales. Higher scores on CFC-future indicate a stronger tendency to consider future consequences, whereas higher scores on CFC-immediate indicate a stronger tendency to consider immediate consequences.

4.2.3.2. Construal level

In line with its original intention, the Behavior Identification Form (BIF; Vallacher & Wegner, 1989) was used as a trait measure of construal level. The BIF contains 25 descriptions of actions (e.g., "climbing a tree"), each followed by an abstract alternative (e.g., "getting a good view") and a concrete alternative (e.g., "holding on to branches"). Participants selected the alternative that, according to them, best fits the original description. Each high-level alternative was given a score of 1 and each low-level alternative was given a score of 0. All scores were averaged to create an overall score (ranging from 0 to 1), with higher scores indicating a higher construal level.

4.2.3.3. Self-reported eating and exercising behavior

Eating behavior was measured with five questions. Participants rated the statement "In general, I eat healthy" on a 7-point Likert-scale (ranging from 1 = *completely disagree* to 7 = *completely agree*). In addition, they indicated the number of days a week they eat fruits, the number of days a week they eat vegetables (scales ranging from *0 days* to *7 days*) as well as the number of servings of fruits (scale ranging from *less than 1 serving* to *more than 5 servings*) and grams of vegetables (scale ranging from *less than 50 grams* to *more than 300 grams*) they eat on each of those days. Exercising behavior was measured with four questions. Participants rated the statement "In general, my physical activity is sufficient" on a 7-point Likert-scale (ranging from 1 = *completely disagree* to 7 = *completely agree*). In addition, they indicated the number of days a week they are physically active for at least 30 minutes a day, the number of days a week they exercise (scales ranging from *0 days* to *7 days*) as well as the number of hours a week they exercise (scale ranging from *0 hours* to *more than 6 hours*). Scores were standardized and averaged to create overall scores of eating and exercising behavior, respectively. Higher scores indicate more healthy eating behavior or more frequent exercising behavior.

4.2.3.4. Eating and exercising preferences

Eating and exercising preferences were measured by means of preferences for hedonic versus utilitarian food products and physical activities. A hedonic–utilitarian classification was used instead of a healthy–unhealthy classification in order to maximize comparability of eating and exercising preferences. Fixed combinations of a hedonic product/activity and a utilitarian product/activity were used, which resulted in two product pairs (M&Ms and granola bar; Mars bar and banana) and two activity pairs (dancing and cleaning the house; playing a game on the Wii and cycling for a good cause). Participants indicated the extent to which they would like to consume one of the products/perform one of the activities by means of a slider (scale ranging from *-100* to *+100*; numbers not visible to participants). Participants did this for six points in time: now, in one hour, tomorrow, the day after tomorrow, in one week, and in one month. For each point in time, scores on the two food pairs and scores on the two exercise pairs were averaged, resulting in six scores for eating preferences and six scores for exercising preferences (i.e., one for each point in time). Correlational, reliability, and factor analyses showed that the six points in time are best treated as a single variable, instead of taking them separately or dividing them into short-term and long-term. Therefore, the six scores were averaged to create overall scores of eating and exercising preferences, respectively. Higher scores indicate stronger preferences for utilitarian products/activities.

4.3. Results

Descriptive statistics for the main constructs are given in Table 4.1. Simple mediation models were tested using the PROCESS macro for SPSS (model 4; Hayes, 2013). To test for indirect effects, 95% bias-corrected bootstrap confidence intervals based on 10,000 bootstrap samples were used. A simple mediation model assesses the (indirect) influence of an independent variable on a dependent variable through a *single* mediator variable (Hayes, 2013). That is, both the effect of the independent variable on the mediator variable and the effect of the mediator variable on the dependent variable are estimated, in addition to the direct effect of the independent variable on the dependent variable. However, even a simple mediation model can include multiple independent and dependent variables. Because the mediation models for food and exercise include two independent variables (i.e., CFC-future and CFC-immediate) and two dependent variables (i.e., self-reported behavior and preferences) they were run four times. It is important to note, however, that in each run both independent variables were included, one as an independent variable and the other one as a covariate. In this way, correlations between CFC-future and CFC-immediate were taken into account. In all runs, the random number generator was seeded with a common seed. All analyses were controlled for gender, age, and body mass index (BMI).

Table 4.1. Descriptive statistics for CFC, construal level, and eating and exercising behavior and preferences

	M	*SD*	α
CFC-food/future	4.39	.91	.80
CFC-food/immediate	3.64	.93	.81
CFC-exercise/future	4.42	.90	.81
CFC-exercise/immediate	3.55	.83	.70
Construal level	.56	.19	.81
Eating behavior	.00	.57	.49
Exercising behavior	.00	.79	.81
Eating preferences	21.61	41.89	.92
Exercising preferences	-2.31	43.65	.95

4.3.1. Self-reported eating and exercising behavior

The direct effects of both consideration of future consequences and consideration of immediate consequences on self-reported eating behavior as well as self-reported exercising behavior were significant (Figure 4.1). Participants with a stronger tendency to consider the future consequences of their eating and exercising behavior reported more healthy eating behavior and more frequent exercising behavior, whereas participants with a stronger tendency to consider the immediate consequences of their eating and exercising behavior reported less healthy eating behavior and less frequent exercising behavior. The indirect effects of both consideration of future consequences and consideration of immediate consequences on self-reported eating and exercising behavior through construal level were not significant.

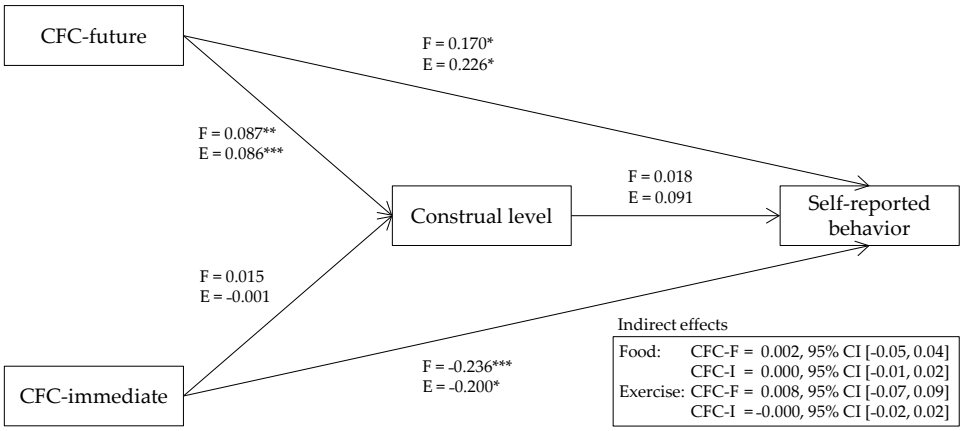


Figure 4.1. Mediation model linking CFC and construal level to self-reported eating and exercising behavior. All coefficients are unstandardized. Indirect effects are significant if the confidence interval does not include zero. F = food; E = exercise; CFC-F = CFC-future; CFC-I = CFC-immediate.
*$p < .05$. **$p < .01$. ***$p < .001$.

4.3.2. Eating and exercising preferences

The direct effects of both consideration of future consequences and consideration of immediate consequences on eating preferences as well as exercising preferences were not significant (Figure 4.2). The indirect effect of consideration of future consequences on eating preferences was significant. Participants with a stronger tendency to consider the future consequences of their eating behavior had a stronger preference for utilitarian food products (as compared to hedonic food products) through a higher (i.e., more abstract) construal level. The indirect effect of consideration of future consequences on exercising preferences was not significant. Additionally, the indirect effects of consideration of immediate consequences on eating and exercising preferences through construal level were not significant.

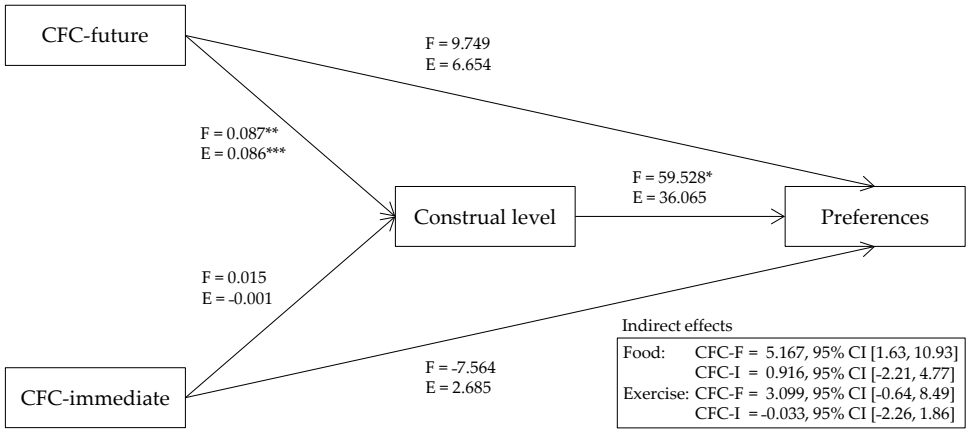


Figure 4.2. Mediation model linking CFC and construal level to eating and exercising preferences. All coefficients are unstandardized. Indirect effects are significant if the confidence interval does not include zero. F = food; E = exercise; CFC-F = CFC-future; CFC-I = CFC-immediate.
$^{**}p < .01$. $^{***}p < .001$.

4.4. Discussion

Trade-offs between present and future consequences are characteristic of eating as well as exercising behavior. Therefore, the extent to which individuals consider the immediate and future consequences of their behavior is an important determinant of such behavior. In this study, we provide more insight into these relations as well as their underlying mechanisms by examining associations of consideration of immediate and future consequences and construal level with eating and exercising behavior and preferences. For eating and exercising behavior, only direct effects of time orientation were found. Consideration of future consequences was positively

and consideration of immediate consequences was negatively related to both eating and exercising behavior. Thus, consideration of future consequences is related to more healthy behavior, whereas consideration of immediate consequences is related to less healthy behavior, but construal level does not explain these relations. For eating preferences, however, there was evidence of an indirect effect through construal level. Consideration of future (but not immediate) consequences was related to preferences for utilitarian (as compared to hedonic) food products through a more abstract level of construal. For exercising preferences, however, no indirect effects were found.

Direct effects of both consideration of future consequences and consideration of immediate consequences on eating behavior as well as exercising behavior were found. Whereas other studies found only effects of consideration of future consequences (Joireman et al., 2012) or different effects for eating and exercising behavior (van Beek et al., 2013), all four direct effects were found in this study. The effect of CFC-food/future on eating behavior which was found in this study but not in a previous study (van Beek et al., 2013) could be due to the increased reliability of the CFC-future subscale in the CFC-14 scale (see also Dassen et al., 2015). In addition, this result is in line with previously found relations between consideration of future consequences and healthy eating attitudes and intentions (Joireman et al., 2012; see also Gick, 2014). Still, it would be worthwhile to investigate whether the effect of consideration of future consequences is indeed similar for attitudes, intentions, and behavior. Another difference between this study and previous studies (Joireman et al., 2012; van Beek et al., 2013), which could possibly explain the diverging results, is that all analyses were controlled for gender, age, and BMI. Previous studies on relations between CFC and health behavior have shown that this can lead to different results (e.g., Adams, 2012). Additionally, it should be noted that the reliability of our measure of eating behavior was low. However, a reliability analysis did not show room for improvement, which is why we decided to still use the overall measure. Finally, the results of these studies could be confirmed and extended by future studies measuring actual food intake and physical activity.

With regard to preferences, an indirect effect of consideration of future consequences on eating preferences was found, but not of consideration of immediate consequences. Whereas this is in line with a study on healthy eating attitudes and intentions (Joireman et al., 2012), it is still somewhat unexpected. Apparently, even quite specific decisions are better predicted by consideration of future consequences than by consideration of immediate consequences. In addition, the relation with preferences can be explained by a higher (instead of a lower) level of construal. Thus, a stronger focus on future consequences is related to a higher level of construal and this explains why future-oriented individuals prefer utilitarian food products

over hedonic food products. Such an indirect effect was not found for exercising preferences. This could be related to our classification of physical activities (as well as food products) as either hedonic or utilitarian. We used this dimension for classification instead of the healthy–unhealthy dimension in order to maximize comparability of eating and exercising preferences. Exercising behavior is inherently healthy, and thus cannot be classified as either healthy or unhealthy, but can still be performed for various reasons (e.g., providing pleasure, being functional). An advantage of this classification is that two types of eating behavior can be compared with two types of exercising behavior, instead of comparing two types of eating behavior with being active versus being inactive. A disadvantage of this classification is that there still is a difference between eating and exercising behavior, because exercising is good for one's health, regardless of whether it is hedonic or utilitarian, whereas eating behavior is good for one's health when it is utilitarian, but not (or at least less) when it is hedonic. Because both types of exercise are inherently healthy individuals probably do not have strong preferences for one option or the other. Consequently, the limited distinctiveness of the two choice alternatives might explain the lack of results regarding exercising preferences. However, further research with an improved measure would be necessary to provide conclusive evidence. It would also be recommended to increase the number of choice alternatives, because in this study, only a limited number of specific product and activity pairs were used.

It is important to note that in this study adapted versions of the original CFC scale were used, one for food and one for exercise. An advantage of these scales is that they are tailored to the type of behavior under investigation, which in turn would result in better predictive capacity (comparable to the discussion about measuring attitudes at a general or specific level in order to predict specific behavior (Ajzen & Fishbein, 1977)). A first study showed that CFC-food was not only correlated with healthy eating behavior (in contrast to the original CFC scale which was not correlated with healthy eating behavior), but also predicted healthy eating behavior (Dassen et al., 2015). In order to get more insight into this issue, future research would have to investigate the predictive capacity of the CFC-food and CFC-exercise scales over and above that of the original CFC scale (see also Probst, Graso, Estrada, & Greer, 2013). This would be useful for comparability of different studies as well, because until now it is unclear whether differences between studies are meaningful or mainly due to differences in measurement. Another issue related to the generalizability of our results is the specific sample that was used in this study. University students cannot be considered as a representative sample of the general population, for example, in terms of age and education level. Therefore, it would be recommended to conduct future studies with different samples to extend the generalizability of our results.

The differential effects that were found for eating and exercising behavior at a general level and at a specific level do have implications for studying and promoting healthy eating and exercising behavior. First of all, researchers should be aware that the level at which they measure behavior can have an impact on relations between consideration of future and immediate consequences and behavior. Second, behavior and preferences were only weakly related to each other indicating that it should not be taken for granted that preferences or choices can be used as a proxy for behavior. Third, in order to promote healthy behavior, it is important to take into account at which level of behavior, for example, health campaigns should be targeted. Next to that, the level of construal of campaigns itself (e.g., using general language, giving specific examples) is important to consider.

All in all, we showed that consideration of immediate and future consequences are differentially related to eating and exercising behavior and preferences. Additionally, an individual's tendency to construe situations either abstractly or concretely explains part of these relations. Application of this knowledge to real life choice settings would shed light on how to promote healthier eating and exercising choices.

Acknowledgements

The authors would like to thank Amber Ronteltap and Siet Sijtsema for their comments on an earlier version of this chapter.

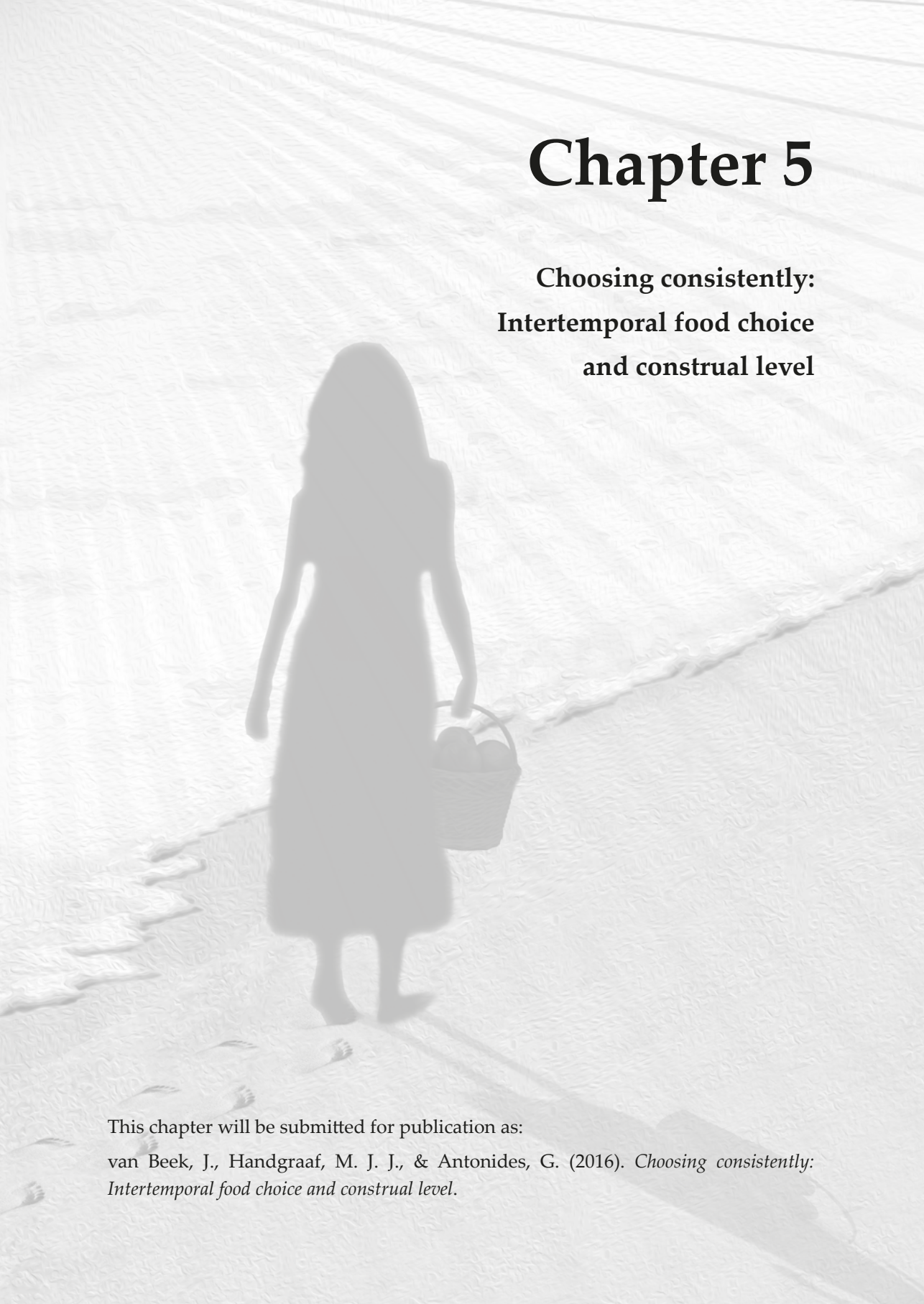
Appendix 4.1. CFC-food and CFC-exercise

CFC-food and CFC-exercise are adapted versions of the Consideration of Future Consequences scale (Strathman et al., 1994). The CFC-12 versions of CFC-food and CFC-exercise can be found in van Beek et al. (2013). Below are items 13 and 14 of the CFC-14 versions (Joireman et al., 2012) of CFC-food and CFC-exercise. The behavior-specific part of each item is shown in italics and CFC-exercise is shown between brackets.

13. When I choose my *food (physical activity),* I think about how it might affect me in the future.
14. My *eating behavior (physical activity pattern)* is generally influenced by future consequences.

Chapter 5

Choosing consistently: Intertemporal food choice and construal level



This chapter will be submitted for publication as:

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (2016). *Choosing consistently: Intertemporal food choice and construal level*.

Abstract

Integration of research on intertemporal choice and construal level could improve our understanding of consumer food choice. We examine whether and how food choices for the future differ from food choices for the present as well as whether making choices at either a high or low level of construal influences food choice. Two experiments were conducted among students (N = 197) and secondary school pupils (N = 271). Participants made two (Study 1), respectively four (Study 2) choices either between categories of snacks or between specific snack products, as a manipulation of construal level, and received their snack either immediately or one week later, as a manipulation of time. Both studies showed that participants did not make healthier choices when they chose a week in advance, as compared to choosing for today, or when they chose between categories, as compared to choosing between products. Even though the manipulations successfully changed participants' intertemporal preferences and choice experience, this did not result in differences in actual food choice. In both studies, however, consideration of immediate consequences predicted the number of healthy food choices. In addition, both consideration of immediate consequences and consideration of future consequences predicted eating behavior in general. Although consistency of choices was more prominent than variation in choices over time, individual differences in time orientation and construal level still explained individuals' food choice and eating behavior.

5.1. Introduction

Food choices are not only made for the present, but also for the future. For example, someone might bring a banana to work in the morning in order to eat the banana at the end of the afternoon. Also, grocery shopping once a week instead of every day leads to a temporal distance between food choice and actual food consumption. Such delays can alter one's choices made a priori. For example, even though individuals take a banana with them in the morning, in the afternoon they might change their mind and have another type of snack. Thus, individuals often choose differently for later consumption than for immediate consumption. Because of the intertemporal nature of these choices, individuals' time orientation, referring to the extent to which they are oriented toward the present or the future, probably explains how they deal with such choices.

In addition, the way in which such intertemporal choices are made could influence the type of choices made, for example, whether one chooses more healthy or more unhealthy food products. One aspect in which choices can differ is the level of abstraction at which they are made. For example, choices can be made between specific products (e.g., an apple versus a Mars bar) or between categories of products (e.g., fruit versus chocolate). Therefore, we link construal level, the level at which individuals mentally represent situations, to intertemporal food choice. It has been suggested that construal level is a potential mechanism through which time orientation influences choices, intentions, and behavior (Joireman, Strathman, & Balliet, 2006; van Beek, Handgraaf, & Antonides, in press-a). We aim to investigate this mechanism by examining the effects of a construal level manipulation on actual intertemporal food choice.

5.1.1. Intertemporal food choice

Intentions to eat healthily are often not accompanied by actual healthy food choices. For example, individuals could decide in the morning to have a healthy afternoon snack that day, but in the afternoon they may choose something unhealthy, despite their earlier intentions. As such, the temporal distance between the intended choice and the actual choice influences one's decisions. Several (field) studies show such influences of temporal distance on food choice. Read and van Leeuwen (1998) told employees that they would distribute free snacks in one week and asked participants to indicate which snack they would like to receive. After a week, the researchers returned to distribute the snacks and emphasized that participants were free to change their mind and choose a different snack than they had indicated a week before. Overall, about 50% of the participants made an unhealthy choice in advance. However, one week later more than 80% of the participants chose an unhealthy

snack. Additionally, results showed that about 74% of the participants made a switch from a healthy snack to an unhealthy snack, whereas the reverse happened in only 5% of the cases.

Two other studies (Weijzen, de Graaf, & Dijksterhuis, 2008; Weijzen, de Graaf, & Dijksterhuis, 2009) showed similar results, yet the effects were much smaller. In the first study, office employees made an advance choice between four food products (i.e., two healthy and two unhealthy products). One week later they made an actual choice between the same four products. In the second study, office employees made an advance choice between eight food products (i.e., four healthy and four unhealthy products). One day later they made an actual choice between eight different food products. About half of the participants in the first study (Weijzen et al., 2008) intended to choose a healthy snack, but 27% of them changed their mind and chose an unhealthy snack one week later. Only 8% of the participants who intended to choose an unhealthy snack chose a healthy snack instead. Thus, even though there is a clear difference in the proportion of participants who change their mind depending on whether their advance choice was either healthy (27%) or unhealthy (8%), still the majority of participants who intended to choose a healthy snack indeed did so (73%). This contrasts with the study by Read and van Leeuwen (1998) in which the majority of the participants did not follow up their intention. Another discrepancy between these studies is that in the second study (Weijzen et al., 2009) more participants switched from an unhealthy advance choice to a healthy actual choice (31%) than from a healthy advance choice to an unhealthy actual choice (24%).

Finally, a real-life illustration of the effects of temporal distance on food choice comes from a study using data of an online supermarket (Milkman, Rogers, & Bazerman, 2010). This study investigated whether the content of an order (e.g., percentage of healthy and unhealthy products) was related to the number of days between placement and delivery of the order. When consumers ordered their groceries either one or two days in advance, which most of them did, no difference was found in the percentage of healthy products. However, for orders placed two to five days in advance it was found that the longer in advance consumers ordered their groceries, the more healthy products they bought.

All together, these studies show that temporal distance has an influence on one's food choice. Still, whereas many individuals switch from a healthy choice to an unhealthy choice over time, some individuals stick to their intended choice and make healthy choices. An individual characteristic that could probably explain such differences is time orientation. Time orientation is a general orientation toward either the present or the future, which includes, but is not limited to, the extent to which one considers the present and future consequences of one's current behavior. Many studies have shown that time orientation is related to a range of health behaviors (for

an overview, see van Beek, Handgraaf, & Antonides, in press-b), including healthy eating attitudes, intentions, and behavior (Dassen, Houben, & Jansen, 2015; Gick, 2014; Joireman, Shaffer, Balliet, & Strathman, 2012; Mullan, Allom, Brogan, Kothe, & Todd, 2014; van Beek, Antonides, & Handgraaf, 2013). Generally, future-oriented individuals make more healthy choices, whereas present-oriented individuals make less healthy choices. Additionally, it has been found that construal level mediates relations between time orientation and eating preferences (van Beek et al., in press-a). Specifically, future-oriented individuals prefer healthy food products over unhealthy food products through a higher, more abstract construal level.

5.1.2. Construal level

Construal Level Theory (CLT) posits that the same event or behavior can be represented at different levels of abstraction (Liberman & Trope, 1998; Trope & Liberman, 2003). High-level construals consist of abstract representations of an event or behavior, whereas low-level construals consist of concrete representations of the same event or behavior. For example, in the case of "reading," one can represent this behavior abstractly as "gaining knowledge" (i.e., high-level construal), but one can also think of it concretely as "following lines of print" (i.e., low-level construal). Thus, a high-level construal focuses on the reason for performing a particular behavior, whereas a low-level construal focuses on the way of performing a particular behavior. Construal level is closely linked to psychological distance and, more specifically, temporal distance. Events that are temporally close are likely to elicit concrete construals, whereas events that are temporally distant are likely to elicit abstract construals. For example, going on holiday next week elicits thoughts about packing bags, whereas going on holiday next year elicits thoughts about the attractiveness of the destination. Such differences do not only exist for temporal distance, but also for spatial, social, and hypothetical distance (Trope & Liberman, 2010).

It has been suggested that high-level construals are related to better self-control. For example, high-level construals, as compared to low-level construals, led to decreased preferences for immediate over delayed outcomes, greater physical endurance, stronger intentions to exert self-control, and less positive evaluations of temptations (Fujita, Trope, Liberman, & Levin-Sagi, 2006). These results suggest that higher levels of construal are potentially also related to healthier food choices. In one study (Fujita & Han, 2009) participants had to make a single hypothetical choice between apples and candy bars after completion of a commonly-used construal level manipulation (i.e., generating categories versus exemplars). All participants were presented with a list of objects (e.g., bird). Participants in the high-level condition were asked to provide the category that each of these objects belongs to (e.g., animal), whereas participants in the low-level condition were asked to provide an example

of each of these objects (e.g., dove). Results showed that 50% of the participants in the *low-level* condition preferred apples over candy bars, whereas about 76% of the participants in the *high-level* condition preferred apples over candy bars.

5.1.3. Study overview

In this chapter we would like to accomplish an integration of the lines of research on intertemporal choice and construal level. Therefore, the aim of this chapter is twofold. First of all, we aim to shed more light on the role of intertemporal choice in eating behavior. Second, we would like to gain more insight into the role of construal level as an underlying mechanism. Additionally, we aim to address two of the limitations and/or weaknesses of previous studies. First, in previous studies (Read & van Leeuwen, 1998; Weijzen et al., 2008, 2009), the actual choice was always one which was preceded by an advance choice (e.g., a week earlier, the day before). Even though researchers emphasized that participants could choose whatever they wanted, regardless of what they had chosen before, this advance choice most likely had at least some influence on the actual choice. Therefore, we added a condition to the design of those studies including the actual choice but omitting the advance choice. In this way, truly present choices can be compared with future choices, while it is still possible to investigate whether individuals' choices change over time.

Another potential limitation of previous studies is that the advance choice and the actual choice were not always comparable. For example, in both studies by Weijzen et al. (2008, 2009), the advance choice and the actual choice were made in different ways. For the advance choice, participants received a sheet of paper containing a list of the available snacks from which they could make a choice. However, during actual choice, the available snacks were displayed on trays from which participants could make their choice. Because Weijzen et al. (2008, 2009) aimed to study the discrepancy between intentions and behavior, it is justifiable that they used different measurements. However, this difference in measurement also involves a difference in what could be labeled sensory distance (Kardes, Cronley, & Kim, 2006). When making the advance choice, not only the temporal distance is large, but also the sensory distance. Consequently, the advance choice is made at an abstract level. When making the actual choice, not only the temporal distance has decreased, but also the sensory distance. As a consequence, the actual choice is made at a more concrete level. Thus, different levels of construal are involved in the two ways in which choices were made which could have influenced the results (see also Kim, Schnall, & White, 2013). Therefore, it is unclear whether previous results are a result of the difference between intentions and behaviors, the temporal distance between the choices, or unintentional differences in construal level. Evidence for the influence of such construal level differences on choice comes from a study in

which the presence or absence of actual products during preference formation and during choice was varied (Kardes et al., 2006). The mere presence of products during preference formation and during choice increased preference–behavior correspondence (i.e., actually choosing the product that one prefers most). Thus, for a fair comparison of choices made at different moments in time, these choices need to be made in exactly the same way in order to avoid unintentional construal level differences. Therefore, in our studies, we show participants the actual products (Study 1) or photographs of the actual products (Study 2) at both choice moments, in order to maximize comparability between the advance choice and the actual choice.

All in all, participants in our studies make choices for snacks to be received either immediately or one week later, as a manipulation of time, and they choose either between categories of snacks or between specific snack products, as a manipulation of construal level. We expect that participants who choose a week in advance will make healthier choices than participants who make choices for the same day. Additionally, for the group of participants that makes an advance choice, we expect that participants who made an initial healthy choice will be more likely to change their mind than participants who made an initial unhealthy choice. With regard to construal level, we expect that participants who choose between categories of snacks will make healthier choices than participants choosing between specific snack products. Several studies on psychological distance and construal level have shown that a match between distance and construal level leads to stronger effects than a mismatch between distance and construal level (Amit, Algom, & Trope, 2009; Fessel, 2011). Applied to our studies, this would imply that participants choosing between categories and for later (i.e., abstract and distant) would make healthier choices than participants in the other three conditions, whereas participants choosing between products and for now (i.e., concrete and close) would make unhealthier choices than participants in the other three conditions. Although this is one option of how an interaction between time and construal level could manifest itself, we do not have specific expectations with regard to this interaction.

5.2. Study 1

5.2.1. Method

5.2.1.1. Participants and design

A total of 210 students of Wageningen University participated. Thirteen participants were excluded because of participation at T1 only (N = 11) or non-compliance with the instructions (N = 2). The final sample consisted of 197 participants (58 male, 123 female, 16 missing) with a mean age of 21.22 (SD = 2.61) years. Participants

were distributed equally among the conditions of the 2 (time: now vs. later) × 2 (construal level: categories vs. products) between-subjects design. Allocation to conditions occurred semi-randomly, because the time conditions were alternated weekly and the construal level conditions were alternated hourly in order to prevent participants' awareness of the experimental manipulations.

5.2.1.2. Procedure

Upon arrival in the lab, participants were seated in semi-cubicles (i.e., individual tables separated by screens). Up to six participants could participate simultaneously. All participants first read an information letter and signed the informed consent form. Then, participants completed several questionnaires, measuring time orientation (i.e., CFC-food, see Section 5.2.1.3.5), eating behavior (see Section 5.2.1.3.7) and construal level (i.e., items 1–13 of the Behavior Identification Form, see Section 5.2.1.3.6). Thereafter, participants were exposed to the time and construal level manipulations for which each condition received different instructions. Therefore, the remainder of the procedure will be discussed separately for the now conditions and the later conditions.

5.2.1.2.1. Now conditions (T1 only)

Participants received the following instructions (category condition in running text, product condition between brackets):

> "Please, make a choice for a snack that you will receive shortly. You can choose from **two types of snacks**. For each type of snack, there are three options. However, you do not know which products these are. (You can choose from two types of snacks. For each type of snack, there are three options. So, you have a choice of **six different products**.) All products are of good, comparable quality. Specify **which type of snack** (**which product**) you choose."

Afterwards participants made two snack choices. Thereafter, they answered some questions about their choice experience and completed the second part of the Behavior Identification Form (i.e., items 14–25). Next, participants in the product condition just received the two products of their choice. Participants in the category condition still had to make their final choices and read the following instructions:

> "Shortly, you will get to see the three options of the type of snack that you have chosen. Please, pick the product of your choice out of the green box and specify on the form that you will receive **which product** you choose."

Afterwards participants in the category condition made their final choices. Next, all participants completed hunger ratings and category and product ratings. Finally, participants were thanked and could take their products home as a reward for participation. The study could be completed in 20 minutes.

5.2.1.2.2. Later conditions (T1 and T2)

Participants received the following instructions at T1 (category condition in running text, product condition between brackets):

> "Please, make a choice for a snack that you will receive next week. You can choose from **two types of snacks**. For each type of snack, there are three options. However, you do not know which products these are. (You can choose from two types of snacks. For each type of snack, there are three options. So, you have a choice of **six different products**.) All products are of good, comparable quality. Try to imagine that you would like a snack **next week** and subsequently choose which **type of snack** (**which product**) you would like to receive next week. Specify on the form that you will receive **which type of snack** (**which product**) you choose."

Afterwards participants made two snack choices, answered some questions about their choice experience and completed the second part of the Behavior Identification Form (i.e., items 14–25). At the end of the study, participants were instructed to generate a personal code, which could be used to link the questionnaires that they completed at T1 and T2. Finally, participants made an appointment for participation at T2. At T2, participants received the following instructions (category condition in running text, product condition between brackets):

> "Please, make choices for snacks that you will receive today. As last week, you can choose from **two types of snacks**. For each type of snack, there are three options. However, you do not know which products these are. (As last week, you can choose from two types of snacks. For each type of snack, there are three options. So, you have a choice of **six different products**.) All products are of good, comparable quality. It is all right if you choose the same as last week, but it is also no problem if you choose a different type of snack (different product) than you did last week. All types of snacks (all products) are sufficiently in stock. Specify on the form that you will receive **which type of snack** (**which product**) you choose."

Afterwards participants made two snack choices and completed some questions about their choice experience. Next, participants in the product condition just received the two products of their choice, whereas participants in the category condition first made their final choices and subsequently also received the two products of their choice. Next, all participants completed hunger ratings and category and product ratings. Finally, participants were thanked and could take their products home as a reward for participation. The study could be completed in 25 minutes (i.e., 15 minutes at T1 and 10 minutes at T2).

5.2.1.3. Measures and manipulations

5.2.1.3.1. Time manipulation

Participants in the now condition (T1 only) completed the experiment in one go and were told that they would make choices for snacks to be received at the end of the experiment. Participants in the later condition (T1 and T2) completed the experiment in two parts conducted approximately one week apart (if possible on the same day of the week and the same time of the day). They were told that they would make choices for snacks to be received a week later when they would participate in the second part of the experiment.

5.2.1.3.2. Construal level manipulation

Participants in the category condition first had to choose between two categories of snacks (e.g., fruits and candy bars). Two closed green boxes with category labels on top of them (e.g., "fruits") were placed on the table and participants had to indicate on a sheet of paper which category they chose. Later on in the experiment an open green box with the three products from the category of their choice (e.g., apple, banana, and orange) was placed on the table and participants could choose one of the three products. Participants in the product condition had to choose between six products from two categories (e.g., apple, banana, orange, Mars, Twix, and Bounty). Two open green boxes with three products each were placed on the table and participants had to indicate on a sheet of paper which product they chose. Later on in the experiment they received the snacks of their choice.

5.2.1.3.3. Categories and products

Two healthy product categories (i.e., fruits and vegetables) and two unhealthy product categories (i.e., candy bars and crisps) were used. Each category consisted of three products (i.e., for fruits: apple, banana, and orange; for vegetables: snack tomato, snack cucumber, and snack paprika; for candy bars: Mars, Twix, and Bounty; for crisps: crisps natural, crisps paprika, and crisps bolognese). The categories/products were presented in four combinations (i.e., fruits and candy bars, vegetables and crisps, fruits and crisps, and vegetables and candy bars). Because participants made two choices, they received only two of these combinations, but they were always presented with all four categories (e.g., first choice between fruits and candy bars and second choice between vegetables and crisps). The two choices were presented in different orders across participants. For the analyses, both snack choices were coded as either healthy (i.e., fruits, vegetables) or unhealthy (i.e., candy bars, crisps). Next, the two choices were summed to create a dependent variable that represented the number of healthy choices participants made (either 0, 1, or 2).

5.2.1.3.4. Choice experience and manipulation checks

After completion of both snack choices, participants completed seven questions about each choice. First of all, they were asked to write down the category/product they chose. Second, they indicated their satisfaction with the chosen option, how difficult it was for them to make a choice, the strength of their preference for the chosen option in comparison to the other option(s), and their satisfaction with the available choice options. As a manipulation check of construal level (measured at both T1 and T2), participants indicated whether they paid more attention to the type of snacks or to the specific products when they made their choice. As a manipulation check of time (measured at T1 only), participants in the now conditions had to indicate whether they would rather like to receive their snack in a week, whereas participants in the later conditions had to indicate whether they would rather like to receive their snack now. All questions were answered on 7-point Likert scales with labeled endpoints (e.g., ranging from 1 = *not satisfied at all* to 7 = *very satisfied*).

5.2.1.3.5. CFC-food

CFC-food is a version of the CFC-14 scale adapted for the food domain (van Beek et al., 2013; van Beek et al., in press-a). The original CFC scale (Strathman, Gleicher, Boninger, & Edwards, 1994) consists of 12 items and has two subscales, CFC-future (five items) and CFC-immediate (seven items; Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008). Recently, two items have been added to the CFC-future subscale resulting in a new CFC-14 scale (Joireman et al., 2012).

5.2.1.3.6. Construal level

The Behavior Identification Form (BIF; Vallacher & Wegner, 1989) was used as a trait measure of construal level. The BIF contains 25 action descriptions (e.g., "climbing a tree"), each followed by an abstract alternative (e.g., "getting a good view") and a concrete alternative (e.g., "holding on to branches"). Participants were asked to select the alternative that, according to them, best fits the original description (see Fujita et al., 2006; Liberman & Trope, 1998). Each high-level alternative was given a score of 1 and each low-level alternative was given a score of 0. All scores were averaged to create a final score of construal level (ranging from 0 to 1), with higher scores indicating a higher level of construal.

5.2.1.3.7. Eating behavior

Eating behavior was measured with five questions. Participants rated the statement "In general, I eat healthy" on a 7-point Likert-scale (ranging from 1 = *completely disagree* to 7 = *completely agree*). In addition, they indicated the number of days a week they eat fruits, the number of days a week they eat vegetables (scales ranging from *0 days* to *7 days*) as well as the number of servings of fruits (scale ranging from *less than 1 serving* to *more than 5 servings*) and grams of vegetables (scale ranging from *less than 50 grams* to *more than 300 grams*) they eat on each of those days.

5.2.1.3.8. Hunger ratings

Participants indicated how hungry they felt at the moment (on a 7-point Likert scale ranging from 1 = *not hungry at all* to 7 = *very hungry*), the time since their last meal (in minutes), and whether they already had lunch (yes/no).

5.2.1.3.9. Category and product ratings

For each category, participants rated its attractiveness on a 7-point Likert scale (ranging from 1 = *not attractive at all* to 7 = *very attractive*). For each product, participants rated their liking of the product on a 7-point Likert scale (ranging from 1 = *not tasty at all* to 7 = *very tasty*).

5.2.2. Results

5.2.2.1. Manipulation checks at T1 and T2

As a manipulation check of time (at T1 only) we tested whether participants in the now condition would rather like to receive their products in a week and whether participants in the later condition would rather like to receive their products now. Results indicated that participants in the later condition would like to receive the product now instead of later (M = 4.980, SD = 1.276), whereas participants in the now condition would not like to receive the products later (M = 3.273, SD = 1.438, p = .000), indicating the usual pattern of intertemporal preferences.

As a manipulation check of construal level (at T1 and T2), we tested whether participants in the category and product conditions differed in the extent to which they paid attention to the type of snack versus the specific products. The manipulation check was significant, both at T1 (p = .004) and at T2 (p = .024), indicating that participants in the product condition (T1: M = 4.057, SD = 1.733; T2: M = 4.011; SD = 1.640) paid more attention to the specific products (as compared to the type of snack) than participants in the category condition (T1: M = 3.340, SD = 1.710; T2: M = 3.245; SD = 1.671).

5.2.2.2. BIF scores at T1

To analyze BIF scores across conditions (at T1 only), an ANOVA was conducted on difference scores with time and construal level as independent variables. Difference scores were calculated by subtracting pre-manipulation BIF scores from post-manipulation BIF scores. The main effect of time was marginally significant (p = .059), whereas the main effect of construal level was not significant (p = .158). There was also a significant interaction of the time and construal level conditions (p = .049). Simple effects analyses indicated that within the later condition, the product and category condition significantly differed in pre- and post-manipulation BIF scores (p = .016). In addition, within the category condition, the now and later condition

significantly differed in pre- and post-manipulation BIF scores (p = .006). Together, this indicates that participants in the later and category condition showed an increase in BIF scores, whereas BIF scores in the other three conditions stayed the same.

5.2.2.3. Number of healthy choices at T1

First, an ANOVA was conducted on the number of healthy choices at T1 with time and construal level as independent variables. No main effects of time (now vs. later, p = .770) or construal level (categories vs. products, p = .876) were found. In addition, the interaction between time and construal level was not significant (p = .317). The number of healthy choices was similar regardless of whether participants chose a snack to be received on the same day or a week later and regardless of whether they chose between categories or between products (see Table 5.1). Because the dependent variable is not continuous, an ordinal regression analysis was also performed, but this did not change the results. Therefore, results from this analysis are not reported.

Second, the same ANOVA was conducted with an alternative dependent variable. For this analysis, the unhealthy options were coded as -1 and the healthy options were coded as +1. Subsequently, the chosen option was multiplied with participants' strength of preference for the chosen option. Again, both main effects (time: p = .808; construal level: p = .449) and the interaction were not significant (p = .409).

Table 5.1. Average number of healthy choices by condition at T1 and T2 (Study 1)

		Category			Product		
		M	*SD*	%[a]	*M*	*SD*	%[a]
Now	T1	1.653	0.522	82.65	1.560	0.577	78.00
Later	T1	1.549	0.610	77.45	1.617	0.534	80.85
	T2	1.588	0.536	79.40	1.596	0.496	79.80

Note. N = 197. The number of healthy choices ranges from 0 to 2.
[a]Percentage of healthy choices.

Third, an ANOVA was conducted on participants' strength of preference for the chosen option with time, construal level, and the number of healthy choices as independent variables. This analysis resulted in a significant main effect of the number of healthy choices (p = .039), which was qualified by a marginally significant interaction between construal level and the number of healthy choices (p = .062). Specifically, for participants who made two healthy choices, participants in the category condition had stronger preferences for their chosen options (M = 5.461, SD = 1.159) than participants in the product condition (M = 4.908, SD = 1.109, p = .004). Within the category condition, both participants who made no healthy choices (M = 6.000, SD = 1.080, p = .048) and participants who made two healthy choices (M = 5.461, SD = 1.159, p = .001) had stronger preferences for their chosen options

than participants who made one healthy and one unhealthy choice (M = 4.703, SD = 0.860). Together, these results seem to suggest mainly that choosing two healthy options when choosing between categories is associated with strong preferences for the chosen options.

5.2.2.4. Choice experience at T1

First, we tested whether participants' choice experience was different across the category and product conditions. Significant effects of construal level were found for choice difficulty (p = .025) and strength of preference for the chosen option (p = .037). Participants in the product condition (M = 3.258, SD = 1.297) experienced more difficulty making choices than participants in the category condition (M = 2.815, SD = 1.440). Participants in the category condition (M = 5.240, SD = 1.127) had a stronger preference for their chosen option than participants in the product condition (M = 4.912, SD = 1.061). No significant effects of construal level were found for satisfaction with either the chosen option (p = .942) or the available options (p = .626). Second, to check whether the number of healthy choices predicts one's choice experience, a series of regression analyses was conducted. It appeared that the more healthy choices participants made, the more satisfied they were with their chosen option (B = 0.420, t = 4.172, p = .000), the less difficult it was to make a choice (B = -0.429, t = -2.456, p = .015), and the more satisfied they were with the available choice options (B = 0.351, t = 2.465, p = .015). The number of healthy choices participants made did not predict strength of preference for the chosen option (B = 0.167, t = 1.190, p = .236).

5.2.2.5. Number of healthy choices at T2

First, an ANOVA was conducted on the number of healthy choices at T2 with construal level as independent variable. No main effect of construal level (categories vs. products, p = .943) was found. As at T1, the number of healthy choices was similar regardless of whether participants chose between categories or between products (see Table 5.1). Second, an alternative ANOVA was conducted for which the chosen option was multiplied with participants' strength of preference for the chosen option. Again, the main effect of construal level was not significant (p = .390). Third, an ANOVA was conducted on participants' strength of preference for the chosen option with construal level and the number of healthy choices as independent variables. This analysis resulted in significant main effects of construal level (p = .002) and the number of healthy choices (p = .000). Participants in the category condition (M = 5.529, SD = .839) had a stronger preference for the chosen option than participants in the product condition (M = 4.979, SD = 1.016). Additionally, participants who made more healthy choices had a stronger preference for the chosen option than participants who made less healthy choices (2 healthy choices: M = 5.449, SD = 0.945; 1 healthy choice: M = 5.053, SD = 0.853). Only one participant made no healthy choices at all, therefore, differences in participants' strength of preference for no versus one

and no versus two healthy choices could not be compared. The interaction between construal level and the number of healthy choices was not significant (p = .287). However, the overall pattern of results was similar to that at T1 suggesting mainly that choosing two healthy options when choosing between categories is associated with strong preferences for the chosen options.

5.2.2.6. Choice experience at T2

A marginally significant effect of construal level was found for choice difficulty (p = .059). Again, participants in the product condition (M = 2.904, SD = 1.210) experienced more difficulty making choices than participants in the category condition (M = 2.431, SD = 1.241). A significant effect of construal level was found for strength of preference for the chosen option (p = .004). As at T1, participants in the category condition (M = 5.529, SD = 0.839) had a stronger preference for their chosen option than participants in the product condition (M = 4.979, SD = 1.016). Again, no significant effects of construal level were found for satisfaction with either the chosen option (p = .363) or the available choice options (p = .215). In addition, it appeared that the more healthy choices participants made, the more satisfied they were with their chosen option (B = .652, t = 4.997, p = .000), the less difficult it was to make a choice (B = -.552, t = -2.300, p = .024), the stronger their preference for the chosen option (B = .530, t = 2.891, p = .005), and the more satisfied they were with the available choice options (B = .621, t = 3.193, p = .002).

5.2.2.7. Differences between T1 and T2

A repeated measures analysis did not show any differences in the number of healthy choices at T1 and T2 (p = .809). In addition, there was no effect of construal level (p = .718). In order to test for switching between T1 and T2, two analyses were conducted. In the first analysis, switching was coded as 0 (participants choose exactly the same category or product) or 1 (participants choose a different category or a different product from the same category). An ANOVA showed a main effect of construal level condition (p = .001). Participants in the product category switched more often than participants in the category condition. However, this is probably due to the difference in switching opportunities between the two conditions. Participants in the category condition can only switch between categories, whereas participants in the product condition can also switch between products (within a category). In the second analysis, therefore, only a switch from one category to another was coded as switching. An ANOVA showed no main effect of construal level condition (p = .150), indicating that switching occurred equally in the category and product conditions.

5.2.2.8. Regression analyses CFC, trait construal level, and eating behavior

Regression analyses were conducted to test whether CFC-future and CFC-immediate predict the number of healthy choices (regardless of condition) as well as eating behavior in general. Due to an error during data collection, gender, age and body mass index (BMI) could not be included in these analyses. First, only CFC-immediate predicted the number of healthy choices at T1 (see Table 5.2). Thus, focusing on the immediate consequences of one's behavior is related to less healthy choices. Second, also at T2 the number of healthy choices was only predicted by scores on CFC-immediate (B = -0.163, t = -2.099, p = .038; CFC-future: B = 0.043, t = 0.502, p = .617). A stronger concern with immediate consequences measured at T1 predicted less healthy choices at T2. However, if the number of healthy choices at T1 was added to the regression analysis, CFC-immediate no longer predicted the number of healthy choices at T2, whereas the number of healthy choices at T1 did (see Table 5.2). This indicates that the relation between CFC-immediate and the number of healthy choices at T2 is due to the consistency in choices across T1 and T2. Results of ordinal regression analyses were the same and are, therefore, not reported. Healthy eating behavior in general was predicted by both CFC-future and CFC-immediate, with CFC-immediate being the strongest predictor (see Table 5.2). A higher concern with future consequences is related to more healthy eating behavior, whereas a higher concern with immediate consequences is related to less healthy eating behavior.

The same series of analyses was performed with trait construal level as a predictor. Trait construal level neither predicted the number of healthy choices at T1 (B = 0.382, t = 1.577, p = .117) or T2 (B = 0.246, t = 0.780, p = .437) nor did it predict eating behavior in general (B = 0.214, t = 0.783, p = .435). Results of ordinal regression analyses were the same, except for the number of healthy choices at T1. In this case, trait construal level became marginally significant (p = .057).

Table 5.2. Regression analyses of CFC-food on the number of healthy choices and eating behavior (Study 1)

	Number of healthy choices at T1			Number of healthy choices at T2			Eating behavior		
	B	*t*	*p*	*B*	*t*	*p*	*B*	*t*	*p*
Constant	2.324	5.933	.000	0.370	0.901	.370	0.194	0.478	.633
CFC-food/future	-0.022	0.385	.700	0.031	0.544	.588	0.163	2.796	.006
CFC-food/immediate	-0.248	-4.741	.000	-0.002	-0.038	.970	-0.275	-5.094	.000
Number of healthy choices at T1	–	–	–	0.689	11.134	.000	–	–	–
Adjusted R^2	.158			.596			.283		

Note. N = 197.

5.2.3. Discussion

As expected, the time manipulation resulted in the usual pattern of intertemporal preferences. Furthermore, the construal level manipulation successfully changed participants' choice experience. However, contrary to our expectations, we did not find any differences in the number of healthy choices across conditions. Participants did not make healthier choices when they chose for later, as compared to when they chose for now, or when they chose between categories, as compared to when they chose between products. Nevertheless, the number of healthy choices was predicted by consideration of immediate consequences. In addition, healthy eating behavior was predicted by both consideration of immediate and consideration of future consequences.

There could be various explanations for these unexpected results. First of all, students of Wageningen University probably make healthier choices than the general population, because Wageningen University is specialized in the agricultural domain and focuses on a healthy food and living environment. Second, the laboratory setting could have made participants (too) aware of the fact that their choices were being monitored, which was not the case in an earlier study (Read & van Leeuwen, 1998) and possibly less salient in two other studies (Weijzen et al., 2008, 2009). Additionally, participants first completed a series of questionnaires (e.g., CFC-food) which could have 'primed' them with the concept of health and consequently made them more inclined to make healthy choices. In Study 2 we addressed these concerns. First of all, the study was conducted in a sample of secondary school pupils. Second, the study was conducted in a classroom setting instead of in a laboratory setting (although participants still knew that they were participating in an experiment). Third, the order of the experimental tasks was reversed. Specifically, participants first made snack choices and thereafter completed all questionnaires. Finally, in order to strengthen the dependent measure, participants were asked to make four snack choices instead of two.

5.3. Study 2

5.3.1. Method

5.3.1.1. Participants and design

A total of 288 pupils of secondary schools in several small towns in the center of the Netherlands participated in the study. Seventeen participants were excluded because they participated at T1 only (N = 6) or T2 only (N = 10) or because of non-compliance with the instructions (N = 1). The final sample consisted of 271 participants (143 male, 127 female, 1 missing) with a mean age of 15.99 (SD = 0.78)

years. Participants were enrolled in either senior general secondary education (*N* = 72) or pre-university education (*N* = 199). Participants were distributed equally among the conditions of the 2 (time: now vs. later) × 2 (construal level: categories vs. products) between-subjects design. Allocation to conditions occurred at the school level (for the construal level conditions) and class level (for the time conditions) in order to prevent participants' awareness of the experimental manipulations.

5.3.1.2. Procedure

Economics teachers of secondary schools were offered the opportunity of participating in the experiment with one or more of their classes. At each school two classes participated, both in either the category condition or the product condition. One class completed the experiment in one go (i.e., the now condition, T1 only), whereas the other class completed the experiment in two parts (i.e., the later condition, T1 and T2). To ensure a sample size of at least 50 per condition, three classes were allocated to each condition (as class size varied from about 15 to 30 pupils). All in all, six schools with two classes each participated in the experiment and each condition consisted of three classes of three different schools. The remainder of the procedure will be discussed separately for the now conditions and the later conditions.

5.3.1.2.1. Now conditions (T1 only)

After answering a few questions on demographics, participants were exposed to the time and construal level manipulations. Participants read the following instructions (category condition in running text, product condition between brackets):

> "Please, make a snack choice four times. Shortly, you will receive one of the snacks you chose. You are allowed to keep and eat the snack. You can choose from **two types of snacks**. For each type of snack, there are three options. However, you do not know which products these are. (You can choose from **six different products**.) All products are of good, comparable quality. Specify **which type of snack** (**which product**) you choose."

Afterwards participants made four snack choices. After each of these choices participants answered some questions about their choice experience and after all four choices they completed some control questions and the manipulation checks. Thereafter, they completed CFC-food, BIF, questions about their eating behavior, category and product ratings, and hunger ratings. When all pupils finished the experiment, they could exchange their questionnaire for the product that they had chosen at the fruits versus candy bars choice. Participants in the product condition just received the product of their choice, whereas participants in the category condition still had to make a choice between the three products of the category of their choice. Thereafter, the researcher gave a presentation about the experiment.

5.3.1.2.2. Later conditions (T1 and T2)

After answering a few questions on demographics, participants were exposed to the time and construal level manipulations. Participants read the following instructions at T1 (category condition in running text, product condition between brackets):

> "Please, make a snack choice four times. Next week, you will receive one of the snacks you chose. You are allowed to keep and eat the snack. You can choose from **two types of snacks**. For each type of snack, there are three options. However, you do not know which products these are. (You can choose from **six different products**.) All products are of good, comparable quality. Try to imagine that you would like a snack **next week** and subsequently choose which type of snack (which product) you would like to receive next week. Specify **which type of snack** (**which product**) you choose."

Afterwards participants made four snack choices. After each of these choices participants answered a few questions about their choice experience and after all four choices they completed some control questions and the manipulation checks. Thereafter, they completed CFC-food, BIF, and questions about their eating behavior. At T2, exactly one week later, participants read the following instructions (category condition in running text, product condition between brackets):

> "Please, make a snack choice four times. Shortly, you will receive one of the snacks you chose. You are allowed to keep and eat the snack. As last week, you can choose from **two types of snacks**. For each type of snack, there are three options. However, you do not know which products these are. (As last week, you can choose from **six different products**.) All products are of good, comparable quality. It is all right if you choose the same as last week, but it is also no problem if you choose something else than last week. Specify **which type of snack** (**which product**) you choose."

Afterwards participants made four snack choices. After each of these choices participants answered some questions about their choice experience and after all four choices they completed some control questions and the manipulation checks. Thereafter, they completed category and product ratings, and hunger ratings. When all pupils finished the experiment, they could exchange their questionnaire for the product that they had chosen at the fruits versus candy bars choice. Participants in the product condition just received the product of their choice, whereas participants in the category condition still had to make a choice between the three products of the category of their choice. Thereafter, the researcher gave a presentation about the experiment.

5.3.1.3. Measures and manipulations

Measures are only discussed if they are different from Study 1.

5.3.1.3.1. Time manipulation

Participants in the now condition (T1 only) completed the experiment in one go and were told that they would make four choices for a snack to be received at the end of the experiment. Participants in the later condition (T1 and T2) completed the experiment in two parts conducted exactly one week apart. They were told that they would make four choices for a snack to be received a week later when they would participate in the second part of the experiment.

5.3.1.3.2. Construal level manipulation

Participants in the category condition first had to choose between two categories of snacks (e.g., fruits and candy bars) and later on between the three products from the category of their choice (e.g., apple, orange, and banana). Participants in the product condition had to choose between six products from two categories (e.g., apple, banana, orange, Mars, Twix, and Bounty). Due to the classroom setting, it was impossible to show all participants the actual products. Therefore, full color pictures were shown to participants at each choice they had to make. Participants in the category condition saw two full color pictures of closed boxes with category labels on top of them (as used in Study 1) and had to indicate which category they chose. Participants in the product condition saw two full color pictures of open boxes with three products each (as used in Study 1) and had to indicate which product they chose. At the end of the experiment, all participants received one of their chosen snacks.

5.3.1.3.3. Categories and products

The same categories and products as in Study 1 were used. The categories/products were presented in four combinations (i.e., fruits and candy bars, vegetables and crisps, fruits and crisps, and vegetables and candy bars). The four choices were presented in two orders across classes. For the analyses, all snack choices were coded as either healthy (i.e., fruits, vegetables) or unhealthy (i.e., candy bars, crisps). Next, the four choices were summed to create a dependent variable that represented the number of healthy choices participants made (either 0, 1, 2, 3, or 4).

5.3.1.3.4. Choice experience, control questions, and manipulation checks

After each choice participants completed three questions to indicate their satisfaction with the chosen option, how difficult it was for them to make a choice as well as the strength of their preference for the chosen option. After completion of all choices, participants completed two control questions to check whether they read the experimental instructions carefully. As a manipulation check of construal level

(measured at both T1 and T2), participants completed four questions. They indicated how abstract/concrete the choice options were, how clear the choice options were (recoded), how easily they could imagine the choice options (recoded), and whether they paid more attention to the type of snack or to the specific products when they made their choice. Scores on two questions were recoded, such that higher scores on each question indicated a higher level of construal. We checked whether the four items could be combined into a single index. However, at both T1 and T2 the reliability of the index was low (Cronbach's alphas of .452, respectively .576), so, we tested all four items separately. As a manipulation check of time (measured at T1 only), participants in the now conditions had to indicate whether they would rather like to receive their snack in a week, whereas participants in the later conditions had to indicate whether they would rather like to receive their snack now. All questions were answered on 7-point Likert scales with labeled endpoints.

5.3.1.3.5. Category and product ratings

Participants indicated their liking of all categories and all products (on a 7-point Likert scale ranging from 1 = *not tasty at all* to 7 = *very tasty*). Additionally, they indicated the healthiness of all categories and all products (on a 7-point Likert scale ranging from 1 = *not healthy at all* to 7 = *very healthy*).

5.3.2. Results

5.3.2.1. Manipulation checks at T1 and T2

As a manipulation check of time (at T1 only) we tested whether participants in the now condition would rather like to receive their products in a week and whether participants in the later condition would rather like to receive their products now. Results indicated that participants in the later condition would like to receive the product now instead of later ($M = 4.294$, $SD = 1.615$), whereas participants in the now condition would not like to receive the products later ($M = 2.696$, $SD = 1.437$, $p = .000$), indicating the usual pattern of intertemporal preferences.

As a manipulation check of construal level, we tested whether participants in the category and product conditions rated the choices differently. At T1, participants in the category condition found the choice options more abstract ($M = 3.606$, $SD = 1.559$, $p = .001$), less clear ($M = 3.173$, $SD = 1.604$, $p = .000$) and could imagine them less easily ($M = 3.622$, $SD = 1.568$, $p = .000$) than participants in the product condition ($M = 3.021$, $SD = 1.422$; $M = 1.901$, $SD = 1.197$; $M = 1.965$, $SD = 1.149$). Even though participants in the category condition ($M = 4.472$, $SD = 1.899$) paid slightly more attention to the type of snack as compared to the specific products than participants in the product condition ($M = 4.092$, $SD = 1.912$), this difference did not reach statistical significance ($p = .102$). All in all, this indicates that the construal level manipulation was successful.

At T2, participants in the category condition also found the choice options more abstract (M = 3.657, SD = 1.523, p = .026), less clear (M = 2.821, SD = 1.507, p = .000) and could imagine them less easily (M = 3.522, SD = 1.481, p = .000) than participants in the product condition (M = 3.045, SD = 1.612; M = 1.758, SD = 0.860; M = 1.742, SD = 0.933). In addition, participants in the category condition (M = 4.716, SD = 1.704, p = .006) paid more attention to the type of snack as compared to the specific products than participants in the product condition (M = 3.848, SD = 1.883). All in all, this indicates that the construal level manipulation again was successful.

5.3.2.2. Number of healthy choices at T1

First, an ANOVA was conducted on the number of healthy choices at T1 with time and construal level as independent variables. No main effects of time (p = .487) or construal level (p = .231) were found. In addition, the interaction between time and construal level was not significant (p = .882). The number of healthy choices was similar regardless of whether participants chose a snack to be received on the same day or a week later and regardless of whether they chose between categories or between products (see Table 5.3). Results of an ordinal regression analysis were the same and are, therefore, not reported.

Second, the same ANOVA was conducted with an alternative dependent variable. For this analysis, the unhealthy options were coded as -1 and the healthy options were coded as +1. Subsequently, the chosen option was multiplied with participants' strength of preference for the chosen option. Again, both main effects (time: p = .342; construal level: p = .479) and the interaction were not significant (p = .580).

Third, an ANOVA was conducted on participants' strength of preference for the chosen option with time, construal level, and the number of healthy choices as independent variables. This analysis resulted in a significant main effect of the number of healthy choices (p = .000), whereas no other main or interaction effects were significant (all ps > .225). Participants who made no healthy choices at all (M = 5.215, SD = 1.032) had a stronger preference for their chosen options than participants who made 1 (M = 4.554, SD = 0.867, p = .000), 2 (M = 4.666, SD = 0.809, p = .001), or 3 (M = 4.711, SD = 1.034, p = .056) healthy choices. Participants who made 4 healthy choices (M = 5.350, SD = 0.844) had a stronger preference for their chosen options than participants who made 1 (p = .005), 2 (p = .010), or 3 (p = .064) healthy choices. Together, these results suggest that both choosing healthy all the time and choosing unhealthy all the time are associated with stronger preferences for the chosen options than choosing a mix of healthy and unhealthy snacks.

Table 5.3. Average number of healthy choices by condition at T1 and T2 (Study 2)

		Category			Product		
		M	*SD*	%[a]	*M*	*SD*	%[a]
Now	T1	1.393	1.229	34.83	1.554	1.305	38.85
Later	T1	1.265	1.305	31.63	1.471	1.152	36.78
	T2	1.147	1.363	28.68	1.456	1.309	36.40

Note. $N = 271$. The number of healthy choices ranges from 0 to 4.
[a]Percentage of healthy choices.

5.3.2.3. Choice experience at T1

First, we tested whether participants' choice experience was different across the category and product conditions. A significant effect of construal level was found for satisfaction with the chosen option ($p = .009$). Participants in the product condition ($M = 5.435$, $SD = .728$) were more satisfied with the chosen option than participants in the category condition ($M = 5.201$, $SD = .723$). No significant effects of construal level were found for choice difficulty ($p = .524$) and strength of preference for the chosen option ($p = .828$). Second, to check whether the number of healthy choices predicted one's choice experience we conducted a series of regression analyses. The number of healthy choices predicted choice difficulty ($B = 0.169$, $t = 3.407$, $p = .001$), but not satisfaction with the chosen option ($p = .447$) and strength of preference for the chosen option ($p = .181$). The more healthy products participants chose, the more difficult it was to make a choice.

5.3.2.4. Number of healthy choices at T2

First, an ANOVA was conducted on the number of healthy choices at T2 with construal level as independent variable. No main effect of construal level ($p = .180$) was found. As at T1, the number of healthy choices was similar regardless of whether participants had to choose between categories or between products (see Table 5.3). Second, an alternative ANOVA was conducted for which the chosen option was multiplied with participants' strength of preference for the chosen option. Again, the main effect of construal level was not significant ($p = .309$). Third, an ANOVA was conducted on participants' strength of preference for the chosen option with construal level and the number of healthy choices as independent variables. This analysis resulted in a significant main effect of the number of healthy choices ($p = .001$), whereas no other main or interaction effects were significant (all ps $> .208$). Participants who made no healthy choices at all ($M = 5.500$, $SD = 0.932$) had a stronger preference for their chosen options than participants who made 1 ($M = 5.000$, $SD = 0.898$, $p = .014$) or 2 ($M = 4.838$, $SD = 0.793$, $p = .000$) healthy choices. Participants who made 4 healthy choices ($M = 5.679$, $SD = 0.857$) had a stronger preference for

their chosen options than participants who made 1 (p = .020), 2 (p = .002), or 3 (M = 4.950, SD = 0.880, p = .081) healthy choices. As at T1, these results suggest that both choosing healthy all the time and choosing unhealthy all the time are associated with stronger preferences for the chosen options than choosing a mix of healthy and unhealthy snacks.

5.3.2.5. Choice experience at T2

No significant effects of construal level were found for satisfaction with the chosen option (p = .133), choice difficulty (p = .166), and strength of preference for the chosen option (p = .927). In addition, it appeared that the number of healthy choices predicted choice difficulty (B = .246, t = 3.544, p = .001), but not satisfaction with the chosen option (p = .277) and strength of preference for the chosen option (p = .305). As at T1, the more healthy products participants chose, the more difficult it was to make a choice.

5.3.2.6. Differences between T1 and T2

A repeated measures analysis did not show any differences in the number of healthy choices at T1 and T2 (p = .378). In addition, there was no effect of construal level (p = .217). In order to test for switching between T1 and T2, two analyses were conducted. In the first analysis, switching was coded as 0 (participants choose exactly the same category or product) or 1 (participants choose a different category or a different product from the same category). An ANOVA showed a main effect of construal level condition (p = .044). Participants in the product category switched more often than participants in the category condition. However, as discussed in Study 1, this is probably due to the difference in switching opportunities between the two conditions. In the second analysis, therefore, only a switch from one category to another was coded as switching. An ANOVA showed no main effect of construal level condition (p = .723), indicating that switching occurred equally in the category and product conditions.

5.3.2.7. Regression analyses CFC, trait construal level, and eating behavior

Regression analyses were conducted to test whether CFC-future and CFC-immediate predicted the number of healthy choices (regardless of condition) as well as eating behavior in general. First, only CFC-immediate predicted the number of healthy choices at T1 (CFC-future was marginally significant, see Table 5.4). Thus, considering the immediate consequences of one's behavior is related to less healthy choices, whereas considering the future consequences of one's behavior tends to be related to more healthy choices. Second, also at T2 the number of healthy choices was only predicted by scores on CFC-immediate (B = -0.508, t = -3.998, p = .000; CFC-future: B = 0.205, t = .1.516, p = .132). A stronger concern with immediate consequences measured at T1 predicted less healthy choices one week later. However, if the number

of healthy choices at T1 was added to the regression analysis, CFC-immediate no longer predicted the number of healthy choices at T2, whereas the number of healthy choices at T1 did (see Table 5.4). This indicates that the relation between CFC-immediate and the number of healthy choices at T2 is due to the consistency in choices across T1 and T2. Gender, age, and BMI were included as covariates in these analyses. Although both gender and age were significant (indicating that girls and older pupils make more healthy choices than boys and younger pupils), the results did not change considerably. The only exception was that CFC-future (B = 0.195, t = 2.062, p = .041) predicted the number of healthy choices at T2, when CFC-immediate and the number of healthy choices at T1 were also included in the regression analysis. Thus, apart from the consistency in choices across T1 and T2, consideration of future consequences measured at T1 predicted the number of healthy choices at T2. Results of ordinal regression analyses were the same and are, therefore, not reported. Healthy eating behavior in general was predicted by both CFC-future and CFC-immediate, with CFC-immediate being the strongest predictor (see Table 5.4). A higher concern with future consequences is related to more healthy eating behavior, whereas a higher concern with immediate consequences is related to less healthy eating behavior.

The same series of analyses was performed with trait construal level as a predictor. Trait construal level predicted the number of healthy choices at T1 (B = 0.715, t = 1.989, p = .048), but did not predict the number of healthy choices at T2 (B = 0.527, t = 0.996, p = .321). A higher level of construal is related to more healthy choices at T1, but unrelated to the number of healthy choices at T2. Trait construal level also predicted eating behavior in general (B = 0.377, t = 2.261, p = .025). A higher level of construal is related to more healthy eating behavior. Adding gender, age, and BMI as covariates to the regression analyses did not change the results considerably.

Table 5.4. Regression analyses of CFC-food on the number of healthy choices and eating behavior (Study 2)

	Number of healthy choices at T1			Number of healthy choices at T2			Eating behavior		
	B	*t*	*p*	*B*	*t*	*p*	*B*	*t*	*p*
Constant	2.159	3.385	.001	0.145	0.231	.817	0.051	0.172	.864
CFC-food/future	0.159	1.667	.097	0.161	1.744	.083	0.106	2.363	.019
CFC-food/immediate	-0.374	-4.150	.000	-0.150	-1.647	.102	-0.131	-3.096	.002
Number of healthy choices at T1	–	–	–	0.773	12.431	.000	–	–	–
Adjusted R^2	.127			.621			.108		

Note. N = 271.

5.3.3. Discussion

Even though several improvements were implemented in the design of Study 2, the results are comparable to those of Study 1. As in Study 1, the experimental manipulations were successful, but we did not find any differences in the number of healthy choices across conditions. Participants made a similar number of healthy choices, regardless of whether they made choices for now or later and regardless of whether they chose between categories or between products. Nevertheless, the number of healthy choices was predicted by consideration of immediate consequences and trait construal level. Additionally, healthy eating behavior was predicted by both consideration of immediate consequences and consideration of future consequences. There are also some differences between the results of Study 1 and Study 2. The most remarkable difference between the two studies is that whereas the majority of participants in Study 1 made healthy choices (approximately 1.60 on a scale from 0 to 2), the majority of participants in Study 2 made unhealthy choices (approximately 1.40 on a scale from 0 to 4). Another difference is that in Study 2 trait construal level also predicted the number of healthy choices at T1 and eating behavior in general.

5.4. General discussion

Food choices are not only made for the present, but also for the future. We provide more insight into the role of such intertemporal choices in eating behavior as well as the potential link with construal level. In two studies we found no difference in the number of healthy choices individuals made depending on whether they chose for now or for later and whether they chose between categories of snacks or between specific snack products. Although the manipulations successfully changed participants' intertemporal preferences and choice experience this did not result in differences in actual intertemporal food choice. Nevertheless, in both studies consideration of immediate consequences predicted the number of healthy choices. In addition, both consideration of immediate consequences and consideration of future consequences predicted healthy eating behavior. Finally, in Study 2, trait construal level predicted the number of healthy choices as well as healthy eating behavior.

First of all, no intertemporal effects were found, whereas these effects have been established in previous studies (Read & van Leeuwen, 1998; Weijzen et al., 2008, 2009). There could be several explanations for this remarkable difference. First of all, the specific samples of participants and their pre-existing preferences could partly explain the lack of variability in the dependent measure. Students of Wageningen University probably care more about health and consequently choose more healthy products than members of the general population might do. On the contrary, secondary school pupils probably care less about health and consequently choose more unhealthy

products than adults might do. Some evidence for the latter suggestion can be found in the effect of age in Study 2. Even within this sample with a quite limited age range, older pupils made more healthy choices than younger pupils. Together, it might be that both samples have very strong pre-existing preferences (either in the healthy or the unhealthy direction), which cannot be overruled by the time and construal level manipulations. Previous studies, in which intertemporal effects have been found (Read & van Leeuwen, 1998; Weijzen et al., 2008, 2009), have all been conducted with adult samples. To provide conclusive evidence for this line of reasoning, a replication of our studies would have to be conducted in an adult general population sample.

Another explanation could be that our studies were conducted in an experimental setting. In Study 1, participants were aware that they were participating in an experiment, but probably also quickly noticed that they were taking part in a study about healthy eating behavior. This effect could have been pronounced by the order in which the experimental tasks were conducted. Participants first completed the CFC-food scale and questions about their eating behavior, which most likely made them aware that the study was about healthy eating behavior and the consequences that current choices might have for the future. However, this cannot be the case in Study 2 in which, on purpose, the order of experimental tasks was reversed. In this study, participants first made snack choices and thereafter completed all questionnaires. Still, it is remarkable that other studies have found large effects of similar manipulations, because participants in some of these studies probably also were aware that their choices were being monitored.

Finally, and theoretically probably most relevant, we presented the choice alternatives in the exactly the same way at both time points, whereas in two previous studies choices were presented in markedly different ways (Weijzen et al., 2008, 2009). In this way, we maximized comparability of choices made at T1 and T2. This could have led to increased consistency of choices over time (see also Kardes et al., 2006), but cannot explain why no differences were found across both the time and construal level conditions at T1. More importantly, however, it is possible that the intertemporal effects that have been found in previous studies are partly due to differences in choice presentation at the two time points. Such differences in measurement result in unintentional differences in sensory distance and construal level. Consequently, it might be possible that intertemporal effects arise partly because advance choices are made in an abstract way, whereas actual choices are made in a concrete way. An important avenue for future research, therefore, is to unravel the effects of temporal distance, sensory distance, and construal level on intertemporal choice.

Second, no effects of the construal level manipulation were found. We manipulated construal level in a novel way, although our manipulation was based on existing manipulations in which participants have to generate categories versus exemplars

(e.g., Fujita & Han, 2009). This manipulation successfully changed participants' choice experience. For example, participants in the category condition paid more attention to the type of snacks, whereas participants in the product condition paid more attention to the specific snack products. However, this difference in choice experience did not translate into different food choices. This could be partly due to several aspects that were discussed before (e.g., pre-existing preferences). In addition, it could be possible that choosing between categories or between products actually does not result in differences in choice.

Third, the number of healthy choices participants made was markedly different between Study 1 and Study 2. Whereas a large majority of participants in Study 1 made healthy choices, a large majority of participants in Study 2 made unhealthy choices. As discussed before, this could be explained by the pre-existing preferences of both students and adolescents. However, norms can also be different in these two samples. Among students of Wageningen University there might be a(n) (implicit) norm to eat healthily, because healthy food and living environments are important topics in the curriculum. In contrast, most adolescents eat unhealthily and are strongly influenced by the social norms of their peers (Stok, de Ridder, de Vet, & de Wit, 2014). Another issue that potentially could be related to differences in the number of healthy choices is the difference in sensory distance across the two studies (see also Kardes et al., 2006). In Study 1, actual products were used, whereas in Study 2, photographs of these products were used. Consequently, the sensory distance was somewhat larger in Study 2 than in Study 1. However, this cannot explain the difference in the number of healthy choices across the two studies, because in this case the pattern of results would have been exactly opposite. In Study 1, the sensory distance was small, which would be related to a lower level of construal and consequently a lower number of healthy choices. In Study 2, the sensory distance was somewhat larger, which would be related to a higher level of construal and consequently a higher number of healthy choices.

Fourth, several relations were found between the number of healthy choices participants made and their choice experience. In Study 1, it turned out that the more healthy choices participants made, the more satisfied they were with their chosen option, the less difficult it was to make a choice, the stronger their preference for the chosen option, and the more satisfied they were with the available choice options. Together, these results indicate that participants were strongly inclined to make healthy choices. In Study 2, it turned out that the more healthy choices participants made, the more difficult it was to make a choice, whereas there was no relation with satisfaction with the chosen option and strength of preference for the chosen option. Together, these results indicate that participants were less inclined to make healthy choices. When participants did make more healthy choices, they also found this more difficult. Probably, they experienced conflict between what they really

wanted to do (i.e., choose something unhealthy) and what they felt they should do (i.e., choose something healthy). These findings confirm the suggestion that the two specific samples have relatively strong pre-existing preferences.

Fifth, previous results regarding relations between consideration of immediate and future consequences and eating behavior were replicated and extended. In each of the two studies, both consideration of immediate consequences and consideration of future consequences predicted eating behavior. In line with other studies, consideration of immediate consequences was the strongest predictor (Dassen et al., 2015; van Beek et al., in press-a). Moreover, in both studies consideration of immediate consequences predicted the number of healthy choices participants made. Participants who were more focused on the immediate consequences of their current behavior also made more unhealthy choices. Finally, in Study 2 trait construal level predicted both eating behavior and the number of healthy choices participants made. A higher level of construal was related to both healthier eating behavior and a higher number of healthy choices (see also Fujita & Han, 2009).

Despite the absence of differences in the number of healthy choices that participants made, the current set of studies has some strengths. First of all, two different samples were used. Next to the often used student sample, we employed a secondary school pupils sample. Second, actual choices instead of hypothetical choices were being made and the choices were presented in an identical way at T1 and T2 in order to maximize comparability of the choices that were made at both moments. Additionally, choices in the two construal level conditions were presented as similar as possible, but were still sufficiently different to create a different choice experience (as indicated by the manipulation check and participants' choice experience). Third, the design of our studies allows for a comparison between truly present choices and future choices by adding a condition in which participants make actual choices without having made any advance choices. Fourth, the dependent variable (i.e., the number of healthy choices) was sensitive enough to pick up effects of individual characteristics such as consideration of future consequences and construal level, indicating that it should also be sensitive enough to pick up effects of the manipulations.

One limitation of the current studies is that it is hardly possible to analyze switching between T1 and T2, because construal level was manipulated simultaneously. Participants in the category condition could only switch between categories (from an unhealthy category to a healthy category or vice versa), whereas participants in the product condition could also switch within categories (e.g., from an apple to a banana). Consequently, switching is more common in the product condition than in the category condition, but this is not a fair comparison. Alternatively, if only switching between categories is counted, switching is less common in the product condition than in the category condition, but this could be due to the fact

that participants are less likely to switch between categories if they also have the possibility to switch within categories. However, given the limited variability in the dependent measure at both T1 and T2, effects of switching would be limited anyway. Another limitation of Study 2 is that there might have been some social influence. Although pupils made their choices privately, they could have realized that at the end of the experiment their classmates would get to know what they chose at one of the four choices they made. This might have increased the tendency to choose unhealthy products.

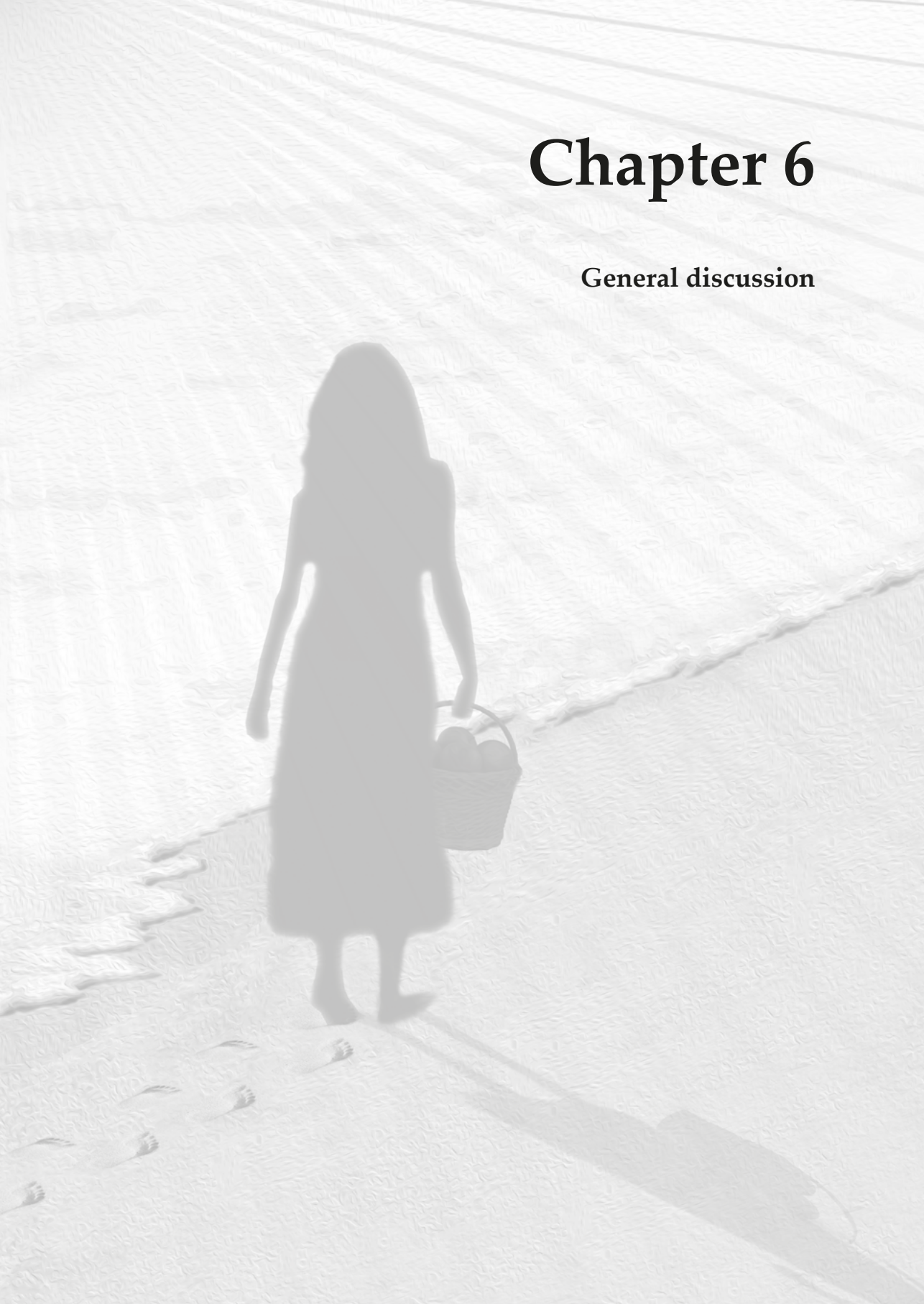
All in all, although our results are unexpected, they still offer new insights into the role of intertemporal choice and construal level in eating behavior. Across two studies, participants consistently chose healthy, respectively unhealthy products, regardless of whether they chose for now or for later and whether they chose between categories of snacks or between specific snack products. However, individual differences in time orientation and construal level were related to the number of healthy choices participants made as well as their eating behavior in general. Although consistency of choices exceeded variation in choices over time, time orientation and construal level still explained differences in the number of healthy choices at the individual level.

Acknowledgements

The authors would like to thank Liesbeth Bouwman for her help with getting in touch with secondary schools for participation in Study 2 and Erica van Herpen for her comments on an earlier version of this chapter.

Chapter 6

General discussion



6.1. Introduction

The main aim of this dissertation is to provide insight into the relations between time orientation and both eating and exercising behavior. In order to do so, three main issues were addressed: (a) behavior-specificity of time orientation, (b) differential relations between time orientation and eating and exercising behavior, and (c) construal level as an underlying mechanism. These three issues were investigated by using a variety of methods (i.e., questionnaires, intertemporal choice experiments) and a variety of eating and exercising measurements (i.e., self-reported behavior, hypothetical preferences, actual intertemporal choices) in a variety of samples (i.e., adolescents, university students, adults from the general population). Consequently, this dissertation contributes in various ways to the literature on relations between time orientation and both eating and exercising behavior. In this chapter we first provide an overview of the main findings regarding each of the three specific aims and discuss the theoretical implications of these findings (Section 6.2). Next, we discuss both the methodological implications (Section 6.3) and practical implications (Section 6.4) of these findings. Thereafter, we provide suggestions for future research (Section 6.5) and the final conclusions (Section 6.6).

6.2. Overview of the main findings and theoretical implications

In this section we provide an overview of the main findings in the theoretical (Chapter 2) and empirical chapters (Chapters 3, 4, and 5) of this dissertation and categorize this overview according to the three specific aims. First, we discuss the main findings with regard to the behavior-specificity of time orientation for two types of behavior (i.e., eating and exercising behavior) within the health domain (Section 6.2.1). Second, we discuss the main findings with regard to the differential relations between time orientation and eating and exercising behavior (Section 6.2.2). Third, we discuss the main findings with regard to construal level as an underlying mechanism explaining relations between time orientation and eating and exercising behavior (Section 6.2.3).

6.2.1. Behavior-specificity of time orientation

Originally, it was assumed that time orientation is a domain-general construct. However, studies on discounting provide evidence that time orientation rather is a domain-specific construct (e.g., Hardisty & Weber, 2009; Lim & Bruce, 2015). Nevertheless, even though different behaviors belonging to a single domain have something in common, they still can be fairly different. For example, both taking vaccinations and being physically active are health-related behaviors, yet they

represent quite different types of behavior. Therefore, in Chapter 3 we extended previous studies by measuring time orientation at a behavior-specific, instead of domain-specific, level. In order to do so, we adapted the Consideration of Future Consequences scale (Strathman, Gleicher, Boninger, & Edwards, 1994) to eating and exercising behavior, resulting in CFC-food and CFC-exercise scales (van Beek, Antonides, & Handgraaf, 2013; van Beek, Handgraaf, & Antonides, in press-a). Importantly, we show that these scales tap into different constructs that in turn have differential effects on behavior (see Section 6.2.2). Our findings that multiple behavior-specific constructs of time orientation can exist within one domain indicate that time orientation is not uniform across a domain. Thus, although it is important to distinguish between domains, it is probably even more important to distinguish between various behaviors within a single domain. For example, it should not be taken for granted that individuals who consider the future consequences of their eating behavior will also consider the future consequences of their exercising behavior and if they do, that this will have similar effects on behavior.

Health behavior provides an excellent example of a domain that consists of a range of behaviors that cannot simply be taken together. Within this broad and diverse domain, however, eating and exercising behavior represent two reasonably closely related behaviors, yet, we find that time orientation for eating behavior and time orientation for exercising behavior are different constructs. Therefore, it is likely that time orientation for types of health behavior that are less closely related (e.g., eating behavior and taking vaccinations) will also represent different constructs. In a similar vein, our findings can be interpreted as indirect evidence of domain-specificity. Given that there are differences in time orientation within a domain (i.e., health), it is highly likely that there will also be differences in time orientation across domains (e.g., health and the environment) as have already been found in temporal discounting studies (e.g., Hardisty & Weber, 2009). However, it is also important to consider that our findings and the implications we just outlined do not exclude the possibility that time orientation has a general part. It may be that time orientation exists of a general basis supplemented with several domain-specific or behavior-specific elements (see Nicholson, Soane, Fenton-O'Creevy, & Willman (2005) for a similar reasoning with regard to risk-taking). Specifically, while individuals might have an overall tendency to be focused on either the present or the future, on top of that they could still have varying levels of present and future orientation across domains or behaviors. If this would be the case, there could be situations in which it might be more practical to use a domain-general scale rather than behavior-specific scales (e.g., when aiming to predict a range of different behaviors).

Next to contributing to a better understanding of the construct of time orientation and its relations with behavior, behavior-specific measurement of time orientation

might have additional advantageous effects. First of all, there is preliminary evidence that behavior-specific measurement, as compared to domain-general measurement, increases the predictive capacity of time orientation measures (e.g., Dassen, Houben, & Jansen, 2015; this issue will be further discussed in Sections 6.3.1.1 and 6.5.1). In addition, a behavior-specific scale inherently provides more context than a domain-general scale, which might have a positive effect on participants' understanding of the scale (this issue will be further discussed in Section 6.3.1.3). However, although we emphasize both the theoretical importance and practical usefulness of measuring time orientation at a behavior-specific level, we are aware that behavior-specific measurement also has limitations. Most importantly, researchers should realize that at some point further specification of time orientation measures is neither necessary nor useful. For example, it does not make sense to measure time orientation at the level of single, very specific, behaviors. For example, although it is useful to measure time orientation for exercising behavior, it is probably not useful to measure time orientation for specific types of exercising behavior (e.g., cycling). Practically, measurement at such specific levels might even have more disadvantages than advantages. First, measurement of time orientation becomes too dispersed if it is measured at increasingly specific levels. Second, such specific measures also create a burden for participants, because they will most likely have to complete multiple, yet very similar, measures. All in all, the behavior-specific level is probably as specific as necessary and useful, yet not too specific.

6.2.2. Differential relations between time orientation and eating and exercising behavior

Although the health domain is one of the most commonly studied domains regarding relations between time orientation and behavior (see for example Joireman & King, 2016; Urminsky & Zauberman, 2015), still there is no conclusive evidence on how exactly time orientation is related to health behavior. Although several methodological issues (which will be discussed in Section 6.3) could contribute to this discrepancy, research into the unique contributions of different dimensions of time orientation might also shed light on this issue. In Chapter 3 we found clear differential effects of consideration of immediate and future consequences on eating and exercising behavior. Specifically, we found that CFC-food/immediate predicted eating behavior, whereas CFC-exercise/future predicted exercising behavior. CFC-food/future and CFC-exercise/immediate did not predict eating, respectively exercising behavior. In contrast, in Chapters 4 and 5 we found that both CFC-food/immediate and CFC-food/future predicted eating behavior. These findings are in line with other studies (Dassen et al., 2015), but more importantly, they do not contradict the findings in Chapter 3. In all cases in which both dimensions predicted eating

behavior, CFC-food/immediate was a stronger predictor than CFC-food/future. Similar results were found in Chapter 4 for exercising behavior, which was predicted by both CFC-exercise/immediate and CFC-exercise/future. However, CFC-exercise/future, which solely predicted exercising behavior in Chapter 3, was the strongest predictor. Thus, although in Chapters 4 and 5 both dimensions predicted eating and exercising behavior (instead of only one of the dimensions), still there were differential effects depending on the type of behavior.

Next to self-reported eating and exercising behavior, we also investigated hypothetical eating and exercising preferences (Chapter 4) and actual intertemporal food choices (Chapter 5). With regard to preferences, we found that neither CFC-future nor CFC-immediate was directly related to hypothetical eating and exercising preferences, although an indirect effect of CFC-future was found for eating preferences (Chapter 4). In Chapter 5, however, there were direct relations between CFC-immediate and actual intertemporal food choice. In line with the findings in Chapter 3 for self-reported behavior, we found that in both studies only CFC-immediate predicted actual intertemporal food choice. Specifically, considering the immediate consequences of one's behavior was related to a lower number of healthy choices. Together, these findings indicate that clearly distinguishing between consideration of immediate consequences and consideration of future consequences as well as examining their unique predictive capacities could contribute to a better understanding of the relations between time orientation and behavior (e.g., by providing the possibility of testing different theoretical models; see also Joireman, Shaffer, Balliet, & Strathman, 2012).

The divergent findings for self-reported behavior on the one hand and preferences and intertemporal choices on the other hand indicate that it is important to take variation in the dependent variables across studies into account when comparing their results. Often different types of behavior are compared, probably with the assumption that results would be similar across different behaviors, whereas our results indicate that there are differential relations depending on the type of behavior. However, even when comparing studies on one type of behavior (e.g., eating behavior), the results seem to be mixed. It is important to note, however, that studies have used different dependent variables such as attitudes, intentions, and behaviors (Dassen et al., 2015; Gick, 2014; Joireman et al., 2012) and that it is not yet clear whether the effect of time orientation on 'behavior' would be similar across these different constructs (see Section 6.3.2.3).

6.2.3. Construal level as an underlying mechanism

Although more and more studies are being conducted on the relations between time orientation and various types of (health) behavior, research on the underlying

mechanisms explaining these relations is still scarce (for an exception, see Joireman et al., 2012). In Chapters 4 and 5 we investigated the role of a potential underlying mechanism, construal level (i.e., an individual's level of abstraction). We found that although trait construal level played a role in the relation between consideration of future consequences and eating preferences (Chapter 4) and also predicted the number of healthy choices participants made (Chapter 5, Study 2), a manipulation of construal level had no effect on actual intertemporal food choice (Chapter 5). Several differences between the studies in Chapters 4 and 5 could be related to this discrepancy. First of all, construal level can be treated as either a trait variable or a state variable. This is, for example, illustrated by the use of the Behavior Identification Form (Vallacher & Wegner, 1989) – originally developed as a personality measure of action identification – as a manipulation check of construal level in experimental studies (e.g., Fujita, Trope, Liberman, & Levin-Sagi, 2006), although it is also still used as a trait measure of construal level (e.g., Hansen & Trope, 2013). Both perspectives on construal level were used in this dissertation. In Chapter 4 a measure of trait construal level was used, whereas in Chapter 5 construal level was manipulated and thus treated as a state variable. Although there are multiple explanations for the findings in Chapter 5 (e.g., the samples that were used, the experimental setting, see Sections 5.2.3, 5.3.3, and 5.4) an additional possibility is that only trait construal level is important in explaining relations between time orientation and behavior. One way to get more insight into this issue could be to manipulate construal level independently from participants' intertemporal choices. Another difference between the studies in Chapters 4 and 5 is the dependent variable. Whereas in Chapter 4 hypothetical preferences were assessed, in Chapter 5 actual intertemporal choices were measured. Thus, hypothetical bias could play a role in Chapter 4. Hypothetical bias refers to the difference between what individuals say they would do and what they actually do or, more specifically, the difference between the amount of money individuals indicate they are willing to pay and the amount of money they actually pay (List & Gallet, 2001; Loomis, 2011). Consequently, participants might indicate that they prefer a certain type of food, whereas they actually choose a different type of food. Finally, even though in Chapter 5 the construal level manipulation successfully changed participants' choice experience, it still might have been too subtle to result in differences in actual intertemporal food choice.

Although trait construal level was involved in the relation between time orientation and eating preferences, it did not play a role in the relation between time orientation and exercising preferences (Chapter 4). Therefore, in Chapter 5, only intertemporal food choice was investigated. As a consequence, it is still unclear whether construal level acts as an underlying mechanism explaining the relation between time orientation and exercising preferences. Other issues, such as

our operationalization of exercising preferences (which will be further discussed in Section 6.3.2.1), might explain this difference between eating and exercising preferences. However, given the findings regarding the behavior-specificity of time orientation as well as its differential relations with eating and exercising behavior, it could also be that the underlying mechanisms explaining these relations are different. For example, one study has found that promotion orientation explains relations between time orientation and exercising behavior (Joireman et al., 2012). Nevertheless, construal level should not be dismissed as a potential underlying mechanism yet, because other studies have found that construal level is related to exercising behavior (Sweeney & Freitas, 2014).

6.3. Methodological implications

Results of studies on relations between time orientation and behavior are sometimes not comparable, difficult to interpret, or even seem to be contradictory due to several methodological issues. In this section we discuss a couple of these issues related to the measurement of time orientation (Section 6.3.1) and the measurement of eating and exercising behavior (Section 6.3.2) and focus on the methodological implications of the main findings of this dissertation.

6.3.1. Measurement of time orientation

6.3.1.1. Domain-specificity and behavior-specificity

Time orientation can be measured at domain-general, domain-specific, or behavior-specific levels. Several studies have shown that behavior-specific measures of time orientation outperform domain-general measures in the prediction of eating and exercising behavior (Dassen et al., 2015; Hall & Epp, 2013; Hall, Fong, & Cheng, 2012). For example, scores on the CFC-food scale predicted healthy eating behavior, whereas scores on the original CFC scale were not related to healthy eating behavior (Dassen et al., 2015). Thus, the predictive capacity of the CFC-food scale was larger than that of the original CFC scale. Together with our findings, this provides compelling evidence for the suggestion of measuring time orientation at a behavior-specific level instead of at a domain-general level. Therefore, when the aim is to predict specific behavior, it is best to measure time orientation at a behavior-specific level.

Additionally, researchers should refer to the different levels of measurement consistently. Currently, the terms domain-general, domain-specific, and behavior-specific are used inconsistently. For example, Hall et al. (2012; see also Hall & Epp, 2013) refer to the diet and exercise versions of the Time Perspective Questionnaire as domain-specific measures, whereas these scales in fact are behavior-specific measures (i.e., for eating behavior and exercising behavior). This probably does not

seem to be problematic because studies on time perspective and consideration of future consequences have skipped the domain-specific level (in contrast to studies on discounting). For example, the original CFC scale is a domain-general measure, whereas the CFC-food and CFC-exercise scales are behavior-specific measures. A domain-specific measure would be, for example, CFC-health or CFC-finance. However, if behavior-specific measures continue to outperform domain-general measures, this indicates that domain-specific measures probably are not useful at all. Nevertheless, behavior-specific measures should not erroneously be labelled domain-specific measures. This is also important for comparisons across research areas. For example, in other fields it might be that domain-specific measures exist, but behavior-specific measures are lacking. For example, several domain-specific measures have been developed in the field of risk-taking, such as the Domain-Specific Risk-Taking Scale (Weber, Blais, & Betz, 2002) and the Risk Taking Index (Nicholson et al., 2005).

6.3.1.2. Unidimensionality or multidimensionality

Currently, both unidimensional and multidimensional operationalizations of time orientation are being used, which leads to a lack of comparability of results across studies. However, the extent to which this is the case differs depending on which conceptualization and measure of time orientation are used. For example, with regard to time perspective there is no discussion that present time perspective and future time perspective are different dimensions of the same construct. Consequently, the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999) clearly distinguishes between present and future time perspective, although researchers sometimes choose to use only the ZTPI Future subscale. With regard to consideration of future consequences and the CFC scale (Strathman et al., 1994), there is much debate about the dimensionality of both the construct and the scale (see Section 6.3.1.3). However, as the majority of evidence indicates that time orientation (including consideration of future consequences) is a multidimensional construct, it is important that researchers clearly distinguish between present orientation and future orientation. Therefore, when using the CFC scale it is important to distinguish between the CFC-immediate and CFC-future subscales instead of using a general CFC score (see also Joireman et al., 2012). Additionally, it is important to realize that present and future orientation or consideration of immediate and future consequences are not polar opposites (see also Zimbardo & Boyd, 1999). Instead, individuals can score either high or low on both dimensions. Finally, the unique contributions of the two dimensions and the interplay between them are largely unknown and are important avenues for future research.

6.3.1.3. Measurement issues of the CFC scale

Consideration of future consequences, the key conceptualization of time orientation in this dissertation, was measured with the Consideration of Future Consequences scale (Strathman et al., 1994). Although we believe that this scale was the best option, we do recognize that there are several measurement issues with the scale that need further attention. Probably, the most important issue is the factor structure of the CFC scale. Even though multiple studies have focused on this issue, results are still inconclusive (see also Joireman & King, 2016). Petrocelli (2003) was the first to examine the factor structure of the CFC scale and recommended the use of an 8-item short version of the original 12-item scale. Subsequent studies showed that the CFC scale (both the original 12-item scale and the revised 14-item scale) actually consists of two factors (Adams, 2012; Bruderer Enzler, 2015; Dassen et al., 2015; Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008; Joireman & Liu, 2014; Joireman et al., 2012; Khachatryan, Joireman, & Casavant, 2013; McKay, Percy, & Cole, 2013b, McKay, Perry, Percy, & Cole, 2016; Rappange, Brouwer, & van Exel, 2009; Toepoel, 2010; van Beek, Antonides, & Handgraaf, 2013; Vásquez Echeverría, Esteves, Gomes, & Ortuño, 2015). Some studies, however, have found different factor solutions. A few studies supported the original unidimensional structure of the scale (Crockett, Weinman, Hankins, & Marteau, 2009; Hevey, Pertl, Thomas, Maher, Craig, & Ni Chuinneagain, 2010), whereas other studies supported a bifactor model (McKay, Cole, & Percy, 2015; McKay, Morgan, van Exel, & Worrell, 2015) or found factor structures with more than two factors (Ainin, Jaafar, & Dezdar, 2015; Ryack, 2012; Zhang, Kong, Zhang, & Li, 2015). The majority of the evidence seems to suggest that a two-factor model fits the CFC scale best. However, in this two-factor model it is remarkable that both factors consist of clusters of consecutive items. Items 1–2, 6–8, and 13–14 make up the CFC-future subscale, whereas items 3–5 and 9–12 make up the CFC-immediate subscale. Therefore, a question for future research is whether this clustering of items influences the factor structure of the scale, which could be investigated by presenting the items in a random order (preferably a unique order for each participant) and comparing this to the standard order.

The original CFC scale has been successfully used in diverse samples, such as adolescents (McKay et al., 2013b; McKay, Dempster, & Mello, 2015; Vásquez Echeverría et al., 2015), adults from the general population (Adams, 2012; Khachatryan et al., 2013; Orbell, Perugini, & Rakow, 2004; Toepoel, 2010), managers (Ainin et al., 2015), financial advisors (Ryack, 2012; Ryack, 2015), and adult offenders (Vásquez Echeverría et al., 2015). However, several studies have reported that the readability and understandability of the scale are limited (Crockett et al., 2009; McKay, Ballantyne, Goudie, Sumnall, & Cole, 2012). Not only younger (McKay et al., 2012) or lower educated (Crockett et al., 2009) people have problems

understanding the scale, even highly-educated people might experience difficulties with understanding specific items. For example, one item reads "I think it is more important to perform a behavior with important distant consequences than a behavior with less important immediate consequences." Because this item varies both importance (i.e., important consequences vs. less important consequences) and distance (i.e., distant consequences vs. immediate consequences), it at least requires some serious consideration and might even be impossible to answer. As an adverse effect, individuals who have difficulties with understanding the items tend to consistently use the midpoint of the scale, which could even lead to inflated levels of reliability (Crockett et al., 2009). Consequently, various studies have used simplified versions of the scale (Bruderer Enzler, 2015; Rappange et al., 2009), provided contextual explanation (Fisher, Erasmus, & Viljoen, 2016), have excluded several items (Bruderer Enzler, 2015), or used a combination of these methods (Luszczynska, Gibbons, Piko, & Tekozel, 2004). As a consequence, results across studies are difficult to compare. Possibly, the use of behavior-specific scales partly alleviates these problems. McKay et al. (2012) reported that adolescents understood the CFC scale better when the items were explained and contextualized. As behavior-specific versions of the CFC scale inherently provide more context than the original scale, a potential side benefit of using these scales is that participants might understand them better than the original CFC scale.

6.3.1.4. Measure–outcome compatibility

Time orientation can be measured in multiple ways depending on its specific conceptualization. Economic conceptualizations of time orientation (e.g., discounting) are often complemented by performance-based measures, whereas psychological conceptualizations (e.g., time perspective) are often complemented by questionnaire measures. However, this difference also has implications for the prediction of a particular outcome. In general, the predictive capacity of discounting measures seems to be limited (Adams & Nettle, 2009; Daugherty & Brase, 2010; see also Section 2.4.1), although this could be partly explained by the use of financial discount rates to predict behavior in other domains (e.g., health behavior). In addition, performance-based measures are more compatible with, and therefore probably more predictive of, actual behavior than self-reported behavior, whereas the opposite could be true for questionnaire measures which are more compatible with, and therefore probably more predictive of, self-reported behavior than actual behavior. Although the choice of conceptualizations and corresponding measures should be mainly based on the research questions and aims of a study, measure–outcome compatibility is an issue to take into account as well.

In addition, different measures might capture different aspects of time orientation and consequently be differentially related to a particular outcome. For example,

it has been found that two questionnaire measures of time orientation (i.e., ZTPI and CFC scale) yielded opposite results in a study on environmentally-friendly behavior (Carmi, 2013b). Thus, it is important to carefully consider which measures are chosen, but also to pay attention to the similarities and differences between the different conceptualizations and measures of time orientation (see Section 2.2.4 and Table 2.1; see also Joireman & King, 2016).

6.3.2. Measurement of eating and exercising behavior

6.3.2.1. Comparability of measures

In order to exclude the possibility that variations in the dependent variables for eating and exercising behavior cause differences in results, it is recommended to measure the dependent variables as comparable as possible. Whereas this is feasible for self-reported behavior, it is difficult for preferences or choices. In Chapter 4 we tried to resolve this problem by classifying both eating and exercising behavior as either hedonic or utilitarian. Although the hedonic–utilitarian classification is malleable, individuals tend to categorize products or activities into one of these categories (Botti & McGill, 2011; Dhar & Wertenbroch, 2000). Some studies have applied the hedonic–utilitarian classification to food products, but seem to operationalize these as healthy versus unhealthy (Antonides & Cramer, 2013; Cramer & Antonides, 2011). However, although it is plausible that for food the classification hedonic–utilitarian aligns with the classification healthy–unhealthy, there is not yet evidence for this. With regard to activities, the hedonic–utilitarian classification has been mainly applied to the shopping context (Babin, Darden, & Griffin, 1994), but also to attitudes toward festivals and other events (Gursoy, Spangenberg, & Rutherford, 2006). Nevertheless, it is possible to apply the hedonic–utilitarian classification to exercising behavior. However, this leads to a disagreement between the healthy–unhealthy and hedonic–utilitarian classifications. Exercising behavior is inherently healthy (even though it can become unhealthy in extreme cases), but still can be perceived as either hedonic or utilitarian, partly depending on the various reasons for which it can be performed (e.g., because it provides pleasure versus because it is necessary; see also Alba & Williams, 2013). In this way, comparability of eating and exercising behavior is maximized, because two types of eating behavior are compared with two types of exercising behavior. The disadvantage of classifying both eating and exercising behavior in this way is that this does not fully resolve the differences in measurement. Exercising behavior is beneficial for one's health, regardless of whether it is hedonic or utilitarian, whereas eating behavior is mainly beneficial for one's health when it is utilitarian. Because both types of exercise are inherently healthy individuals probably do not have strong preferences for either hedonic or utilitarian exercising behavior. They might, however, have stronger preferences

for behavior that is either active (e.g., taking the stairs) or inactive (e.g., taking the elevator). Classifying exercising behavior in this way also results in differences in measurement, because in this case two types of eating behavior are compared with the presence or absence of exercising behavior. All in all, each classification has both advantages and disadvantages, so, it is probably worthwhile to use both of them in future research in order to unravel which classification is most useful.

6.3.2.2. Validated measures

In several studies we measured eating and exercising behavior by means of self-developed questions. These questions were based on Dutch guidelines on the amount of fruit and vegetables individuals should eat as well as the amount of physical activity individuals should perform. Nevertheless, those measures did not always reach sufficient levels of reliability (e.g., the measure for self-reported eating behavior in Chapter 4). The decision to develop questions ourselves was based on the wish to use short and simple questionnaires instead of, for example, an eating diary or food frequency questionnaire. In our studies it was not necessary and sometimes even impossible to measure eating and exercising behavior in an extensive way (e.g., in Study 2 of Chapter 3 which was conducted in the train). This indicates that there is a need for simple, but validated, self-report measures of eating and exercising behavior that can be used in cases in which researchers are not able or do not need to measure behavior in an extensive way.

6.3.2.3. Behavior versus behavior-related constructs

Studies on eating and exercising behavior do not always actually measure behavior, but a range of related constructs, such as attitudes, intentions, preferences, or (intertemporal) choices. In addition, some studies measure hypothetical preferences or choices, whereas other studies measure actual preferences or choices. As discussed before, hypothetical bias could be involved in such cases. Also, when behavior is actually measured, it can be either self-reported or actual behavior. More importantly, however, it is not yet clear whether the relations between time orientation and behavior are similar to the relations between time orientation and behavior-related constructs. Therefore, results of studies using different behavior-related constructs cannot automatically be compared. In addition, behavior-related constructs (e.g., preferences) cannot always be used as a proxy for actual behavior. For example, in Chapter 4, there were only limited correlations between specific preferences and general behavior. Thus, researchers should clearly communicate which constructs they measured and be careful with drawing conclusions about related constructs that they did not measure.

6.4. Practical implications

Next to theoretical and methodological implications, the results of this dissertation have several practical implications, for example, for developers of campaigns to stimulate healthy behavior. First of all, it is important to realize that recommendations for one type of behavior usually cannot be generalized to another type of behavior. Although eating and exercising behavior are quite closely related, their determinants, as well as the way in which these determinants are related to behavior, are different. Depending on the type of behavior, individuals might differ in the extent to which they take the immediate and future consequences of their behavior into account. Such differences are important to consider when determining at which aspects campaigns should be targeted. For example, decisions have to be made with regard to what type of consequences will be emphasized, either the immediate or the future ones, either the positive or the negative ones. In addition, such decisions will need to be different depending on the type of behavior. For example, we found that for eating behavior immediate consequences have a stronger influence, whereas for exercising behavior future consequences have a stronger influence. Therefore, in order to stimulate healthy eating behavior, it is probably best to emphasize the positive immediate consequences of healthy eating behavior (e.g., "an apple is tasty"). For exercising behavior, however, it might be better to emphasize the negative future consequences of physical inactivity (e.g., "sedentary behavior is related to weight gain"). Finally, even though this dissertation only provides preliminary evidence with regard to the influence of construal level, it is an important variable to take into account. Various aspects of campaigns can be presented at different levels of construal. For example, the use of either text or pictures already induces different levels of construal (Rim, Amit, Fujita, Trope, Halbeisen, & Algom, 2015). In addition, a distinction between high and low levels of construal is their differential focus on why versus how aspects. As such, a campaign that mainly emphasizes why individuals should behave healthily is construed at a higher level than a campaign that mainly emphasizes how individuals could behave healthily, which in turn can influence the effectiveness of the campaign (see for example Chang & Chiou, 2015; Sweeney & Freitas, 2014).

6.5. Limitations and suggestions for future research

Although the research presented in this dissertation contributes in many ways to a better understanding of the relations between time orientation and eating and exercising behavior (as outlined in Section 6.2), it is not without limitations. In this section we discuss these limitations and complement them with suggestions for future research.

6.5.1. Domain-specificity and behavior-specificity of time orientation

Our findings present evidence that time orientation is a behavior-specific construct for at least two types of behavior within the domain of health behavior. However, without additional research, these results cannot be generalized to other types of behavior within the health domain or to behavior in different domains. As discussed before, the health domain is very broad and diverse, ranging from eating behavior to taking vaccinations, and from exercising behavior to the use of alcohol, cigarettes and drugs. These types of behavior can be classified along various dimensions. For example, the timing of costs and benefits varies across behavior. Both eating and exercising behavior not only are accompanied by future health benefits, but also can provide present benefits (e.g., exercise can be enjoyable). In contrast, health behaviors aimed at preventing future health costs are accompanied by present costs (e.g., screening for a particular diseases can be inconvenient). This is the case for detective behavior, such as diabetes screening (e.g., Crockett et al., 2009), and preventive behavior, such as sunscreen use (e.g., Orbell & Kyriakaki, 2008). Consumption behaviors can also vary with regard to several aspects. For example, food consumption on the one hand and consumption of alcohol, cigarettes and drugs on the other hand differ in the extent to which they are necessary as well as in the extent to which they are addictive. In addition, in the case of addictive behaviors, the relation with time orientation might even be reversed (i.e., being addicted may influence one's time orientation instead of vice versa, see Chapman, 2005). An avenue for future research could be investigating whether time orientation is also behavior-specific for these diverse types of behavior and, more importantly, how this consequently influences behavior. However, in doing so, researchers should be aware that behavior-specific measurement has its limitations (see Section 6.2.1). Investigating whether time orientation is also behavior-specific in different domains is another avenue for future research. Our finding that time orientation is behavior-specific within the health domain does not automatically imply that time orientation will also be behavior-specific in other domains. For example, time orientation could be behavior-specific for various types of financial behavior (e.g., spending, saving) or various types of environmentally-friendly behavior (e.g., saving water, recycling), but it is also possible that time orientation is uniform within each of these domains.

Although we show that time orientation is behavior-specific for eating and exercising behavior, we have not investigated the predictive capacity of the CFC-food and CFC-exercise scales as compared to that of the original CFC scale. However, other studies have already addressed this gap. The CFC-food scale has been used in several studies on eating behavior (Dassen et al., 2015; Dassen, Jansen, Nederkoorn, & Houben, 2016). One of these studies showed that scores on the CFC-food scale predicted healthy eating behavior in contrast to scores on the original

CFC scale that were not related to healthy eating behavior (Dassen et al., 2015). Thus, the predictive capacity of the CFC-food scale was larger than that of the original CFC scale. Recently, similar initiatives have been developed for different types of behavior and for different measures of time orientation. An example of the former is the development of the Consideration of Future Safety Consequences scale (Probst, Graso, Estrada, & Greer, 2013). An example of the latter is the development of several versions of the Time Perspective Questionnaire tailored to diet, exercise, alcohol use, and smoking (Hall, Fong, & Cheng, 2012; Hall & Fong, 2013). In line with the study by Dassen et al. (2015), it has been found that the diet and exercise versions of the Time Perspective Questionnaire outperform the domain-general scale (Hall & Epp, 2013; Hall et al., 2012). In studies on discounting behavior-specific measures are now being used as well, such as adaptations of the Monetary Choice Questionnaire (Kirby, Petry, & Bickel, 1999) to weight-loss (Lim & Bruce, 2015) and snacking behavior (Dassen et al., 2015). Together, these developments indicate that behavior-specific measurement of time orientation has become a topic of interest in the last few years which contributes to our understanding of the construct of time orientation.

6.5.2. Dimensionality of time orientation and the CFC scale

Both theoretically and methodologically it is important that agreement will be reached on the dimensionality of time orientation in general and the CFC scale (Strathman et al., 1994) in particular. With regard to the latter, it would be recommended to conduct a large-scale study (comparable to Sircova et al., 2014) in multiple countries in which the CFC-14 scale (Joireman et al., 2012) is administered to various samples (e.g., adolescents, students, and adults from the general population). Such a study should preferably also vary methods (i.e., paper and pencil versus online) and, more importantly, item order (i.e., standard order versus random order per participant). Exploratory factor analysis complemented by confirmatory factor analysis of all factor solutions that have been found in the literature (one-factor solution, two-factor solution, solutions with more than two factors, solutions with correlated error terms, bifactor solutions) would hopefully result in conclusive evidence regarding the factor structure of the scale. Consequently, results of future studies would be more comparable and different theoretical models of the relations between CFC and behavior can be tested (see Joireman, Stratman, & Balliet, 2006).

6.5.3. Interplay between eating and exercising behavior

Both eating and exercising behavior contribute to the problem of overweight and obesity, therefore it is important to investigate both of them in combination. By doing so, the studies presented in this dissertation provide insight into the similarities and differences between them. Divergent results for eating and exercising behavior indicate

that findings for eating behavior cannot be automatically translated to exercising behavior and vice versa. However, we did not investigate the interplay between eating and exercising behavior. As outlined in Chapter 1 there could be various ways in which eating and exercising can be either positively or negatively related. Therefore, eating and exercising behavior should not only be studied simultaneously, but future research should also look into the relations between them. Another issue that could be taken up by future research is the distinction between healthy and unhealthy or active and inactive behavior. When measuring general behavior, we always assessed only healthy (e.g., fruit intake) or active (e.g., playing sports) behavior and not unhealthy (e.g., snack intake) or inactive (e.g., using the computer) behavior. Distinguishing these two types of behavior in future research would further increase our understanding of the relations between time orientation and behavior.

6.5.4. Changes over time and long-term effects

Although we made some preliminary attempts at examining how behavior changes over time, for example, by measuring preferences at different time points (ranging from now till one month later, Chapter 4) and investigating intertemporal choice (Chapter 5), most of our studies were cross-sectional. Therefore, two avenues for future research are investigating how behavior changes over time and whether relations between time orientation and behavior can also be found over longer time periods. For example, does the extent to which an individual considers the immediate and future consequences also predict behavior sometime in the future? A related aspect that could be taken into account is the link between a particular behavior and its consequences. Even though people are probably aware that their behavior eventually will have consequences, they do not know which consequences they will experience and when. Because uncertainty increases with temporal distance, this effect is probably stronger for future than for immediate consequences. As Strathman et al. (1994, p. 750) note "The CFC Scale, not surprisingly, may simply be a better predictor of behavior when the relationship between present behavior and future implications is very clear." Therefore, it might also be useful to link the concept of elaboration on potential outcomes (Nenkov, Inman, & Hulland, 2008) to consideration of future consequences, because one of its dimensions is related to the extent to which people evaluate whether potential consequences are both likely and important. Different types of behavior might vary in the level of uncertainty that is involved in the link between a particular behavior and its consequences. Consequently, this might explain why differences in the predictive capacity of the CFC scale are found across behaviors.

6.5.5. Individual and context levels

The focus of the studies presented in this dissertation was mainly on the individual level and less on the context level. However, it has been argued that the environment plays a major role in the rise of overweight. Excessive food consumption is encouraged and being physically active is discouraged by the environment (French, Story, & Jeffery, 2001). Yet, not everyone living in this obesogenic environment becomes overweight or obese. Thus, individual differences still have a significant influence on food consumption and physical activity. Consequently, we mainly focused at the individual level, although in Chapter 5 we also focused on the context level (by manipulating the way in which choices were presented). Future research should combine these approaches by investigating interactions between the individual level and the context level. This would provide insight into how different (groups of) individuals respond to different contexts.

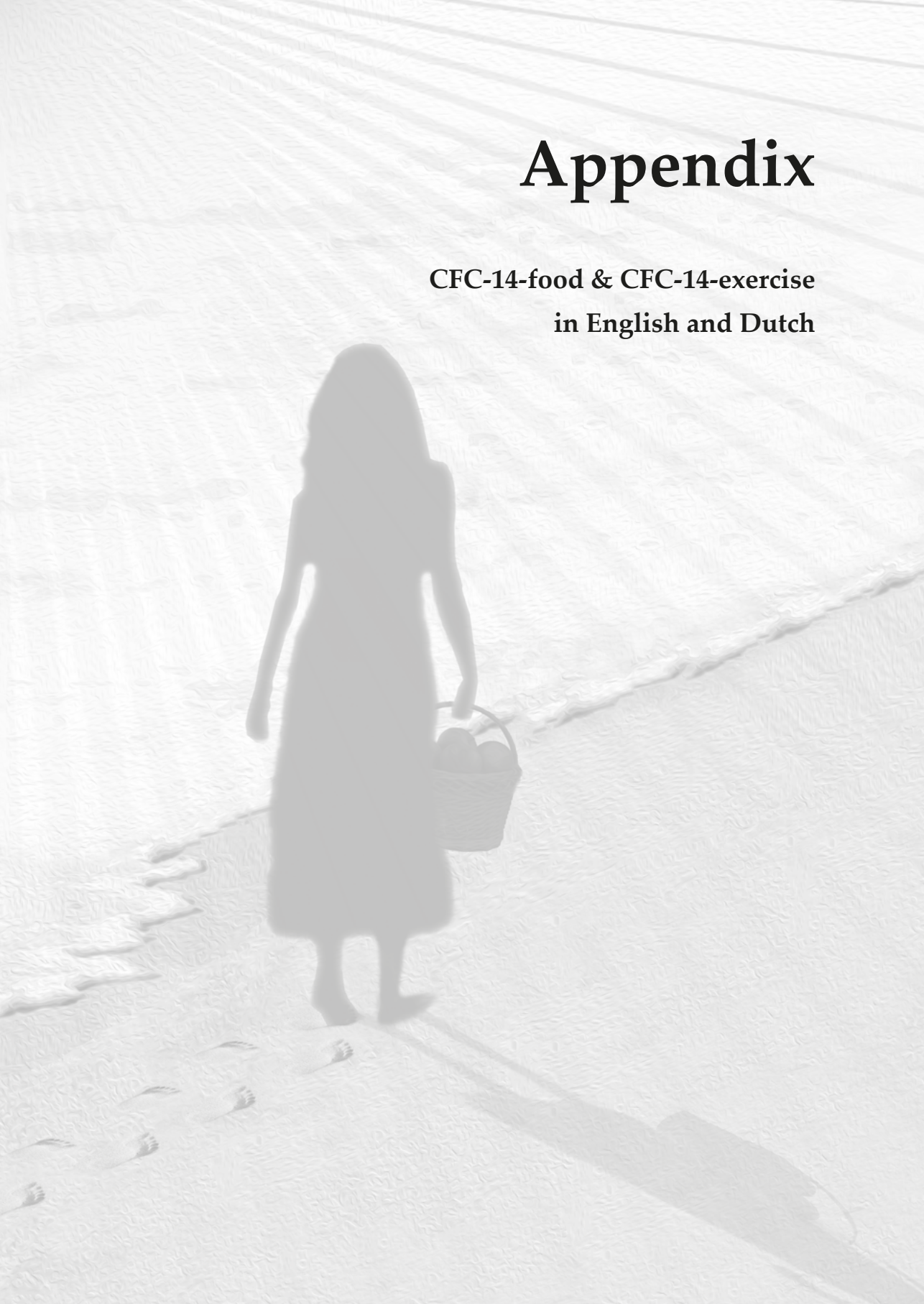
6.6. Conclusions

Both eating and exercising behavior are typical examples of behaviors with an intertemporal character in which trade-offs between potential costs and benefits are involved. Our findings confirm that time orientation is a shared determinant of eating and exercising behavior. Nevertheless, time orientation was found to be behavior-specific and was differentially related to eating and exercising behavior. Although in several cases both consideration of immediate consequences and consideration of future consequences predicted eating and exercising behavior, the strength of these relations depended on the type of behavior. Eating behavior (including actual intertemporal food choice) was mainly influenced by consideration of immediate consequences, whereas exercising behavior was mainly influenced by consideration of future consequences. Finally, construal level explained relations between consideration of future consequences and eating preferences, but not exercising preferences.

In conclusion, the research presented in this dissertation provides insight into the relations between time orientation and both eating and exercising behavior and contributes to a better understanding of individuals' intertemporal decision making in the health domain. Additionally, the research presented in this dissertation yielded several methodological and practical implications as well as multiple avenues for future research. Applying the methodological implications in future research will improve the measurement of time orientation as well as eating and exercising behavior, whereas the practical implications provide guidelines that can be used in the development of health campaigns. Ultimately, the insights that have been, and will be, gained can be used in order to promote and stimulate healthy eating and exercising behavior.

Appendix

CFC-14-food & CFC-14-exercise
in English and Dutch



Background information on the CFC-food and CFC-exercise scales

CFC-food and CFC-exercise are behavior-specific versions of the Consideration of Future Consequences scale (Strathman, Gleicher, Boninger, & Edwards, 1994; see also Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008; Joireman, Shaffer, Balliet, & Strathman, 2012). The CFC-12 versions of CFC-food and CFC-exercise can be found in van Beek, Antonides, and Handgraaf (2013). Items 13 and 14 of the CFC-14 versions of CFC-food and CFC-exercise can be found in van Beek, Handgraaf, and Antonides (in press-a). In this appendix we provide both the English and Dutch versions of the CFC-14-food and CFC-14-exercise scales.

All items of the CFC-food and CFC-exercise scales are answered on a 7-point Likert scale (ranging from 1 = *completely disagree* (in Dutch: *helemaal mee oneens*) to 7 = *completely agree* (in Dutch: *helemaal mee eens*)). Both CFC-food and CFC-exercise consist of CFC-future and CFC-immediate subscales. The CFC-food/future and CFC-exercise/future subscales consist of the items 1, 2, 6, 7, 8, 13, and 14. The CFC-food/immediate and CFC-exercise/immediate subscales consist of the items 3, 4, 5, 9, 10, 11, and 12. In order to calculate scores for these subscales, scores on the respective items need to be summed and subsequently divided by seven.

CFC-14-food – English version

1. I consider how my health might be in the future, and try to influence my health with my day to day eating behavior.
2. Often I engage in a particular eating behavior in order to achieve outcomes that may not result for many years.
3. I only choose my food to satisfy immediate needs, figuring the future will take care of itself.
4. My eating behavior is only influenced by the immediate (i.e., a matter of days or weeks) consequences of my actions.
5. My convenience is a big factor in the food I choose or my eating behavior.
6. I am willing to sacrifice the immediate happiness or well-being I derive from my eating behavior in order to achieve future outcomes.
7. I think it is important to take warnings about negative consequences of my eating behavior seriously even if the negative consequence will not occur for many years.
8. I think it is more important to perform eating behavior with favorable distant consequences than eating behavior with less favorable immediate consequences.
9. I generally ignore warnings about possible future consequences of my eating behavior because I think they will be resolved before they reach crisis level.
10. I think that sacrificing particular food now is usually unnecessary because future outcomes can be dealt with at a later time.
11. I only choose my food to satisfy immediate needs, figuring that I will take care of future problems that may occur at a later date.
12. Because my day to day eating behavior has specific consequences, it is more important to me than behavior that has distant consequences.
13. When I choose my food, I think about how it might affect me in the future.
14. My eating behavior is generally influenced by future consequences.

CFC-14-exercise – English version

1. I consider how my health might be in the future, and try to influence my health with my day to day physical activity pattern.
2. Often I engage in a particular physical activity pattern in order to achieve outcomes that may not result for many years.
3. I only choose my physical activity to satisfy immediate needs, figuring the future will take care of itself.
4. My physical activity pattern is only influenced by the immediate (i.e., a matter of days or weeks) consequences of my actions.
5. My convenience is a big factor in the physical activity I choose or my physical activity pattern.
6. I am willing to sacrifice the immediate happiness or well-being I derive from my physical activity pattern in order to achieve future outcomes.
7. I think it is important to take warnings about negative consequences of my physical activity pattern seriously even if the negative consequence will not occur for many years.
8. I think it is more important to perform physical activity with favorable distant consequences than physical activity with less favorable immediate consequences.
9. I generally ignore warnings about possible future consequences of my physical activity pattern because I think they will be resolved before they reach crisis level.
10. I think that sacrificing particular physical activity now is usually unnecessary because future outcomes can be dealt with at a later time.
11. I only choose my physical activity to satisfy immediate needs, figuring that I will take care of future problems that may occur at a later date.
12. Because my day to day physical activity pattern has specific consequences, it is more important to me than behavior that has distant consequences.
13. When I choose my physical activity, I think about how it might affect me in the future.
14. My physical activity pattern is generally influenced by future consequences.

CFC-14-food – Nederlandse versie

1. Ik denk na over hoe mijn gezondheid in de toekomst zou kunnen zijn en probeer mijn gezondheid te beïnvloeden door mijn dagelijkse eetgedrag.
2. Vaak houd ik mij bezig met een bepaald eetgedrag dat pas over enige jaren gevolgen zal hebben.
3. Ik kies mijn voeding alleen om aan onmiddellijke behoeften te voldoen, ervan uitgaande dat het in de toekomst vanzelf wel goed komt.
4. Mijn eetgedrag wordt alleen beïnvloed door de onmiddellijke (denk aan een periode van enige dagen of weken) gevolgen van mijn handelingen.
5. Mijn gemak is een belangrijke factor in de voeding die ik kies of mijn eetgedrag.
6. Ik wil het plezier dat ik op dit moment krijg van mijn eetgedrag opofferen om in de toekomst bepaalde resultaten te bereiken.
7. Ik denk dat het belangrijk is waarschuwingen over negatieve gevolgen van mijn eetgedrag serieus te nemen, zelfs al zouden deze negatieve gevolgen zich pas in de verre toekomst voordoen.
8. Ik denk dat het belangrijker is mij bezig te houden met eetgedrag dat in de toekomst belangrijke gevolgen heeft dan met eetgedrag dat onmiddellijke maar minder belangrijke gevolgen heeft.
9. In het algemeen negeer ik waarschuwingen over toekomstige gevolgen van mijn eetgedrag, omdat ik denk dat dit vanzelf zal worden opgelost.
10. Ik denk dat het niet nodig is om op dit moment bepaalde dingen niet te eten, omdat toekomstige gevolgen later altijd nog zijn op te lossen.
11. Ik kies mijn voeding alleen om aan onmiddellijke behoeften te voldoen, ervan uitgaande dat ik problemen die zich later kunnen voordoen dan wel zal aanpakken.
12. Omdat mijn dagelijkse eetgedrag specifieke gevolgen heeft, is het belangrijker voor me dan gedrag dat toekomstige gevolgen heeft.
13. Als ik mijn voeding kies, denk ik na over hoe het me zal beïnvloeden in de toekomst.
14. Mijn eetgedrag wordt in het algemeen beïnvloed door toekomstige gevolgen.

CFC-14-exercise – Nederlandse versie

1. Ik denk na over hoe mijn gezondheid in de toekomst zou kunnen zijn en probeer mijn gezondheid te beïnvloeden door mijn dagelijkse bewegingspatroon.
2. Vaak houd ik mij bezig met een bepaald bewegingspatroon dat pas over enige jaren gevolgen zal hebben.
3. Ik kies mijn beweging alleen om aan onmiddellijke behoeften te voldoen, ervan uitgaande dat het in de toekomst vanzelf wel goed komt.
4. Mijn bewegingspatroon wordt alleen beïnvloed door de onmiddellijke (denk aan een periode van enige dagen of weken) gevolgen van mijn handelingen.
5. Mijn gemak is een belangrijke factor in de beweging die ik kies of mijn bewegingspatroon.
6. Ik wil het plezier dat ik op dit moment krijg van mijn bewegingspatroon opofferen om in de toekomst bepaalde resultaten te bereiken.
7. Ik denk dat het belangrijk is waarschuwingen over negatieve gevolgen van mijn bewegingspatroon serieus te nemen, zelfs al zouden deze negatieve gevolgen zich pas in de verre toekomst voordoen.
8. Ik denk dat het belangrijker is mij bezig te houden met een bewegingspatroon dat in de toekomst belangrijke gevolgen heeft dan met een bewegingspatroon dat onmiddellijke maar minder belangrijke gevolgen heeft.
9. In het algemeen negeer ik waarschuwingen over toekomstige gevolgen van mijn bewegingspatroon, omdat ik denk dat dit vanzelf zal worden opgelost.
10. Ik denk dat het niet nodig is om op dit moment meer te gaan bewegen, omdat toekomstige gevolgen later altijd nog zijn op te lossen.
11. Ik kies mijn beweging alleen om aan onmiddellijke behoeften te voldoen, ervan uitgaande dat ik problemen die zich later kunnen voordoen dan wel zal aanpakken.
12. Omdat mijn dagelijkse bewegingspatroon specifieke gevolgen heeft, is het belangrijker voor me dan gedrag dat toekomstige gevolgen heeft.
13. Als ik mijn beweging kies, denk ik na over hoe het me zal beïnvloeden in de toekomst.
14. Mijn bewegingspatroon wordt in het algemeen beïnvloed door toekomstige gevolgen.

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Summary

Current choices might not always have favorable future consequences. This trade-off between current and future consequences is present in many life domains, but in particular in the domain of health behavior. Enjoying delicious food can be attractive now, but might have negative future health consequences. Being physically active can be unattractive now, but might have positive future health consequences. Both the intertemporal character of such decisions and the inherent trade-offs between potential costs and benefits makes them particularly challenging to deal with. Whether these decisions turn out to be healthy or unhealthy, respectively active or inactive, will be determined by many factors. Nevertheless, both eating and exercising behavior could be determined by time orientation, which refers to an individual's general orientation toward the present or the future.

The main aim of this dissertation is to provide insight into the relations between time orientation and both eating and exercising behavior in order to better understand individuals' intertemporal decision making in the health domain and ultimately stimulate healthy eating and exercising behavior. First of all, we aim to investigate whether time orientation is behavior-specific for eating and exercising behavior (Chapter 3). Second, we aim to investigate whether time orientation is differentially related to eating and exercising behavior (Chapters 3 and 4). Third, we aim to get insight into a potential underlying mechanism (i.e., construal level) explaining these relations (Chapters 4 and 5).

In **Chapter 1**, the general introduction, we introduce the societal context that underlies the topic of this dissertation. Contemporary Western societies are confronted with rising levels of overweight and obesity. The two main determinants of weight gain are energy intake (by means of caloric consumption) and energy expenditure (by means of physical activity). Therefore, it is important to investigate eating and exercising behavior simultaneously. In addition, these two types of behavior have in common that current actions are required in order to achieve future benefits. In order to have a better health in the future, individuals have to eat healthy instead of unhealthy food, which might be associated with immediate costs in terms of sacrificed pleasure. Similarly, individuals have to be physically active instead of inactive, which might be associated with immediate costs in terms of time, money, and effort. Therefore, time orientation is a promising concept to explain variation in eating and exercising behavior. In Chapter 1 we discuss the definition, conceptualization, and measurement of time orientation, determinants of time orientation, relations between time orientation and behavior, and potential underlying mechanisms of these relations. Furthermore, we introduce the main aim and the specific aims of this dissertation.

Before we empirically investigate relations between time orientation and eating and exercising behavior, we provide a theoretical overview of research on this topic in **Chapter 2**. First, we discuss and compare various conceptualizations of time orientation, such as discounting, time perspective, and consideration of future consequences, and ways to measure these concepts. In addition, we provide an overview of the relations between these concepts. Thereafter, we discuss the extent to which time orientation is a domain-general or domain-specific construct by reviewing studies that compare time orientation within and between various domains, such as money and health. Specifically, we show that differences in time orientation not only exist between domains, but also within domains. Finally, we discuss relations between time orientation and health behavior and pay attention to several measurement issues that hinder the interpretation of these relations.

In **Chapter 3** we investigated whether time orientation is behavior-specific for eating and exercising behavior. In order to do so, we developed two behavior-specific variants of the Consideration of Future Consequences scale (see Appendix), one for eating behavior (labeled CFC-food) and one for exercising behavior (labeled CFC-exercise). Two studies were conducted, one among students of Wageningen University and one among the general population. The results of these studies indicated that the CFC-food and CFC-exercise scales tap into different constructs, which provides evidence that time orientation is behavior-specific. In turn, these constructs were differentially related to eating and exercising behavior. Specifically, eating behavior was predicted by CFC-food/immediate, but not by CFC-food/future, whereas exactly the opposite pattern of results appeared for exercising behavior, which was predicted by CFC-exercise/future, but not by CFC-exercise/immediate. Thus, it is important to take both consideration of immediate consequences and consideration of future consequences into account, because these two dimensions of time orientation predict different types of behavior.

In Chapters 4 and 5 we aim to get insight into a potential underlying mechanism explaining relations between time orientation and eating and exercising behavior. We expected that time orientation is related to construal level, referring to the level at which individuals mentally represent situations, and that this in turn explains differences in preferences, choices, and behavior. In **Chapter 4** we report a study in which time orientation, construal level, general eating and exercising behavior (matching a high, abstract level of construal) as well as specific eating and exercising preferences (matching a low, concrete level of construal) were measured. We expected that the effect of construal level as an underlying mechanism is strongest when the level at which eating and exercising are measured matches individuals' level of construal. We found that consideration of immediate and future consequences were directly related to general eating and exercising behavior (as in Chapter 3).

For specific eating preferences, however, there was evidence of an indirect effect through construal level. A stronger tendency to consider future consequences led to a stronger preference for utilitarian food products (as compared to hedonic food products) through a more abstract construal level. Such an effect was not found for exercising preferences. Thus, construal level partially explains the relations between consideration of immediate and future consequences and eating and exercising behavior and preferences.

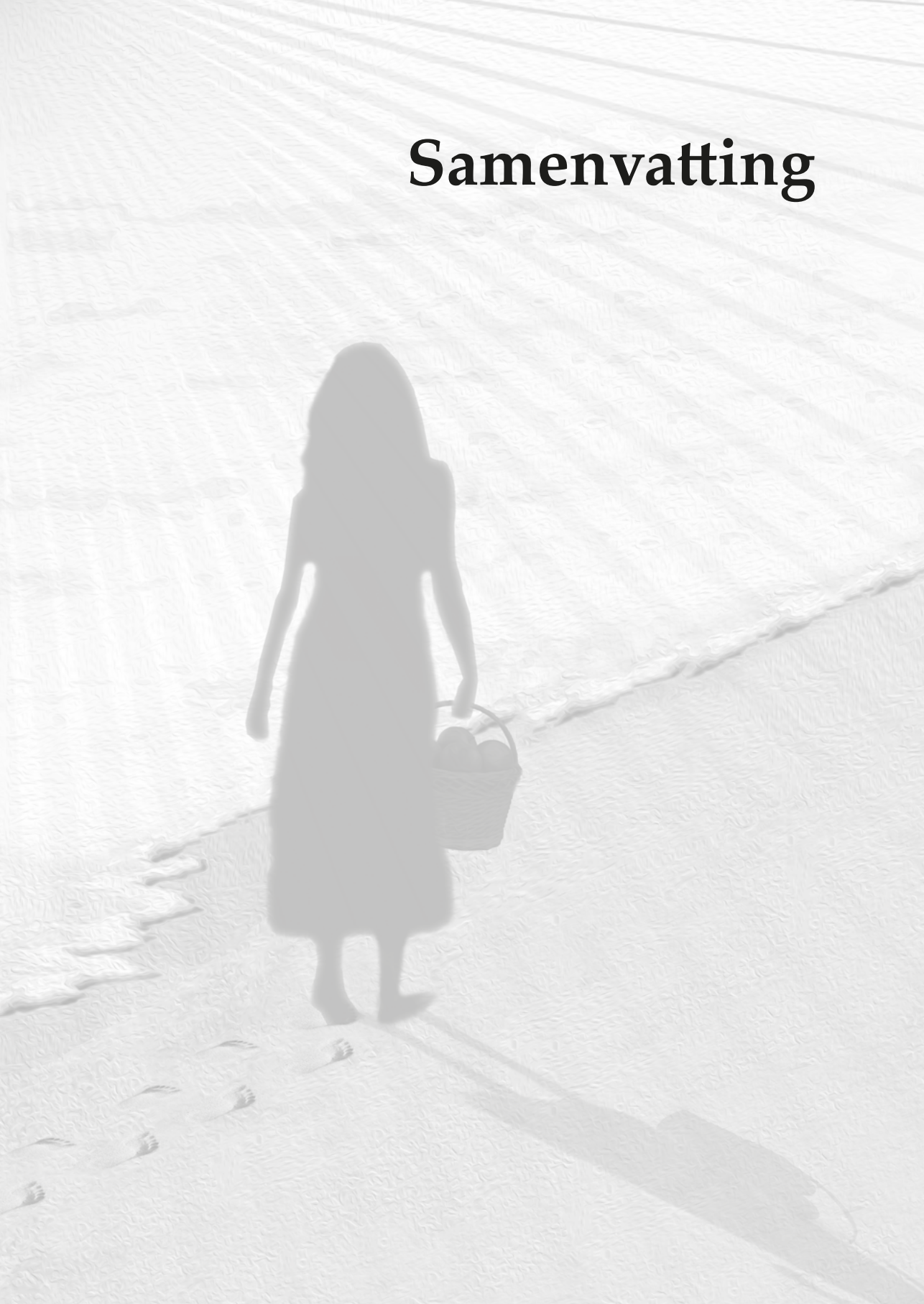
In **Chapter 5** we report intertemporal choice experiments that extend the study reported in Chapter 4 in two ways. First of all, we manipulated construal level instead of measuring it. Second, we investigated the effect of this construal level manipulation on actual intertemporal food choice. Two experiments were conducted, one among students of Wageningen University and one among pupils of secondary schools. Participants made two, respectively four choices either between categories of snacks or between specific snack products and received their snacks either immediately or one week later. Both experiments showed that participants did not make healthier choices when they made their choices a week in advance (as compared to making choices for now) or when they made choices between categories of snacks (as compared to making choices between specific snack products). In addition, participants in Study 1 consistently made healthy choices, whereas participants in Study 2 consistently made unhealthy choices. Nevertheless, in both studies consideration of immediate consequences predicted the number of healthy food choices. In addition, both consideration of immediate consequences and consideration of future consequences predicted eating behavior in general (as in Chapters 3 and 4). Although consistency of choices was more prominent than variation in choices over time, individual differences in time orientation and construal level still explained individuals' food choice and eating behavior.

In **Chapter 6**, the general discussion, we provide an overview of the main findings of this dissertation and discuss their theoretical, methodological, and practical implications. Theoretically, the results of this dissertation contribute in various ways to a better understanding of the construct of time orientation and its relations with eating and exercising behavior. Specifically, we show (a) that time orientation is behavior-specific for eating and exercising behavior; (b) that time orientation is differentially related to eating and exercising behavior; and (c) that construal level partly acts as an underlying mechanism explaining these relations. Methodologically, the results of this dissertation have several implications for the measurement of time orientation on the one hand and the measurement of eating and exercising behavior on the other hand. Specifically, it is important to distinguish between the CFC-future and CFC-immediate subscales when using the CFC scale; be aware of the advantages and disadvantages of the various ways in which eating and exercising behavior can

be measured; and realize that it is not yet clear whether the relations between time orientation and behavior-related constructs (e.g., intentions, preferences) are similar to the relations between time orientation and actual behavior. Practically, the results of this dissertation can be used in the development of campaigns to stimulate healthy eating and exercising behavior. Specifically, developers of such campaigns should take into account that recommendations for one type of behavior usually cannot be generalized to another type of behavior and that several aspects of a campaign (e.g., the use of text versus pictures) will induce different levels of construal, which in turn can influence the effectiveness of the campaign. Furthermore, we provide suggestions for future research, for example, on the domain-specificity and behavior-specificity of time orientation, the dimensionality of the CFC scale, the interplay between eating and exercising behavior, changes over time and long-term effects, and the influence of the environment.

In conclusion, the research presented in this dissertation provides insight into the relations between time orientation and both eating and exercising behavior and contributes to a better understanding of individuals' intertemporal decision making in the health domain. The results of this dissertation confirm that time orientation is a shared determinant of eating and exercising behavior. Nevertheless, time orientation for food and for exercise are different constructs that, in turn, have differential relations with eating and exercising behavior which can be partly explained by construal level. Ultimately, the insights that have been gained in this dissertation can be used in order to promote and stimulate healthy eating and exercising behavior.

Samenvatting



Huidige keuzes hebben niet altijd gunstige gevolgen in de toekomst. Deze afweging van huidige en toekomstige gevolgen vindt plaats op allerlei gebieden in het leven, maar met name op het gebied van gezondheid. Genieten van lekker eten kan nu aantrekkelijk zijn, maar zou in de toekomst negatieve gevolgen voor de gezondheid kunnen hebben. Fysiek actief zijn kan nu onaantrekkelijk zijn, maar zou in de toekomst positieve gevolgen voor de gezondheid kunnen hebben. Het is lastig om met dergelijke beslissingen om te gaan, vanwege zowel het intertemporele karakter als de inherente afweging van mogelijke kosten en baten. Of deze beslissingen uiteindelijk gezond of ongezond dan wel actief of inactief uitvallen, wordt bepaald door vele factoren. Desalniettemin kunnen keuzes op het gebied van zowel eetgedrag als beweging bepaald worden door tijdsoriëntatie, wat verwijst naar de mate waarin een individu in het algemeen gericht is op het heden of de toekomst.

Het voornaamste doel van dit proefschrift is het verkrijgen van inzicht in de relaties tussen tijdsoriëntatie en zowel eetgedrag als beweging om op die manier bij te dragen aan een beter begrip van intertemporele besluitvorming op het gebied van gezondheid en uiteindelijk gezond eetgedrag en beweging te stimuleren. Ten eerste willen we onderzoeken of tijdsoriëntatie gedragsspecifiek is voor eetgedrag en beweging (Hoofdstuk 3). Ten tweede willen we nagaan of tijdsoriëntatie verschillend gerelateerd is aan eetgedrag en beweging (Hoofdstuk 3 en 4). Ten derde willen we inzicht verkrijgen in een mogelijk onderliggend mechanisme (namelijk abstractieniveau) dat deze relaties verklaart (Hoofdstuk 4 en 5).

In **hoofdstuk 1**, de algemene inleiding, introduceren we de maatschappelijke context die ten grondslag ligt aan het onderwerp van dit proefschrift. Hedendaagse westerse samenlevingen worden geconfronteerd met een toename van overgewicht en obesitas. De twee belangrijkste determinanten van gewichtstoename zijn energie-inname (door middel van consumptie van calorieën) en energieverbruik (door middel van lichamelijke activiteit). Daarom is het van belang om eetgedrag en beweging gelijktijdig te onderzoeken. Bovendien is één van de overeenkomsten tussen deze twee soorten gedrag dat huidige handelingen vereist zijn om toekomstige voordelen te behalen. Om in de toekomst een betere gezondheid te hebben, moeten individuen gezond in plaats van ongezond eten, wat geassocieerd zou kunnen worden met onmiddellijke kosten in termen van opgeofferd plezier. Evenzo moeten individuen lichamelijk actief zijn in plaats van inactief, wat geassocieerd zou kunnen worden met onmiddellijke kosten in termen van tijd, geld en moeite. Op grond daarvan is tijdsoriëntatie een veelbelovend concept voor het verklaren van variatie in zowel eetgedrag als beweging. In hoofdstuk 1 bespreken we de definitie, conceptualisatie en meting van tijdsoriëntatie, determinanten van tijdsoriëntatie, relaties tussen tijdsoriëntatie en gedrag en mogelijke onderliggende mechanismes van deze relaties. Verder introduceren we het hoofddoel en de specifieke doelen van dit proefschrift.

Voordat we de relaties tussen tijdsoriëntatie en eetgedrag en beweging empirisch gaan onderzoeken, geven we in **hoofdstuk 2** een theoretisch overzicht van onderzoek naar dit onderwerp. Allereerst bespreken en vergelijken we diverse conceptualisaties van tijdsoriëntatie, zoals disconteren, tijdsperspectief en het overwegen van toekomstige gevolgen, en manieren om deze concepten te meten. Daarnaast geven we een overzicht van de relaties tussen deze concepten. Vervolgens bespreken we de mate waarin tijdsoriëntatie een algemeen of domeinspecifiek construct is aan de hand van onderzoeken waarin tijdsoriëntatie is vergeleken binnen en tussen verschillende domeinen, zoals financiën en gezondheid. We laten zien dat verschillen in tijdsoriëntatie niet alleen tussen domeinen bestaan, maar ook binnen domeinen. Tot slot bespreken we relaties tussen tijdsoriëntatie en gedrag op het gebied van gezondheid waarbij we aandacht besteden aan diverse meetkwesties die de interpretatie van deze relaties belemmeren.

In **hoofdstuk 3** hebben we onderzocht of tijdsoriëntatie gedragsspecifiek is voor eetgedrag en beweging. Om dit te doen hebben we twee gedragsspecifieke varianten van de Consideration of Future Consequences vragenlijst ontwikkeld (zie de appendix), één voor eetgedrag (genaamd CFC-food) en één voor beweging (genaamd CFC-exercise). Twee studies werden uitgevoerd, één onder studenten van Wageningen Universiteit en één onder de algemene bevolking. De resultaten van deze studies geven aan dat met de CFC-food en CFC-exercise vragenlijsten verschillende constructen worden gemeten. Daaruit blijkt dat tijdsoriëntatie gedragsspecifiek is. Deze constructen waren op hun beurt verschillend gerelateerd aan eetgedrag en beweging. Eetgedrag werd voorspeld door het overwegen van de onmiddellijke gevolgen van eetgedrag, maar niet door het overwegen van de toekomstige gevolgen van eetgedrag, terwijl precies het tegenovergestelde patroon optrad voor beweging dat werd voorspeld door het overwegen van de toekomstige gevolgen van beweging, maar niet door het overwegen van de onmiddellijke gevolgen van beweging. Het is dan ook belangrijk om rekening te houden met zowel de overweging van onmiddellijke gevolgen als de overweging van toekomstige gevolgen, omdat deze twee dimensies van tijdsoriëntatie verschillende soorten gedrag voorspellen.

In hoofdstuk 4 en 5 willen we inzicht verkrijgen in een mogelijk onderliggend mechanisme dat de relaties tussen tijdsoriëntatie en eetgedrag en beweging verklaart. We verwachtten dat tijdsoriëntatie gerelateerd is aan abstractieniveau, wat verwijst naar het niveau waarop individuen situaties mentaal representeren, en dat dit vervolgens verschillen in voorkeuren, keuzes en gedrag verklaart. In **hoofdstuk 4** rapporteren we een studie waarin tijdsoriëntatie, abstractieniveau, algemeen eetgedrag en beweging (overeenkomend met een hoog abstractieniveau) alsook specifieke voorkeuren voor voeding en beweging (overeenkomend met

een laag abstractieniveau) werden gemeten. We verwachtten dat het effect van abstractieniveau als onderliggend mechanisme het sterkst is als het niveau waarop eetgedrag en beweging zijn gemeten overeenkomt met het abstractieniveau van het individu. Uit deze studie bleek dat het overwegen van onmiddellijke gevolgen en het overwegen van toekomstige gevolgen direct gerelateerd is aan algemeen eetgedrag en beweging (zoals in hoofdstuk 3). Voor specifieke voorkeuren voor voeding vonden we echter bewijs voor een indirect effect via abstractieniveau. Een sterkere neiging om toekomstige gevolgen te overwegen leidde tot een sterkere voorkeur voor utilitaire voedingsproducten (in vergelijking met hedonistische voedingsproducten) via een hoger abstractieniveau. Een dergelijk effect werd niet gevonden voor specifieke voorkeuren voor beweging. Abstractieniveau verklaart dus gedeeltelijk de relaties tussen het overwegen van onmiddellijke en toekomstige gevolgen enerzijds en eetgedrag, beweging, en voorkeuren anderzijds.

In **hoofdstuk 5** rapporteren we intertemporele keuze-experimenten die op twee manieren een uitbreiding vormen op de studie in hoofdstuk 4. Allereerst hebben we abstractieniveau gemanipuleerd in plaats van gemeten. Ten tweede onderzochten we het effect van deze manipulatie van abstractieniveau op werkelijke intertemporele voedselkeuzes. Twee experimenten werden uitgevoerd, één onder studenten van Wageningen Universiteit en één onder middelbare scholieren. Deelnemers maakten twee respectievelijk vier keuzes tussen soorten tussendoortjes of tussen specifieke producten en ontvingen hun tussendoortje ofwel onmiddellijk ofwel één week later. Beide experimenten toonden aan dat deelnemers geen gezondere keuzes maakten wanneer ze hun keuzes een week van tevoren maakten (in vergelijking met het maken van keuzes voor nu) of wanneer ze keuzes maakten tussen soorten tussendoortjes (in vergelijking met het maken van keuzes tussen specifieke producten). Bovendien was het zo dat deelnemers in studie 1 consistent gezonde keuzes maakten, terwijl deelnemers in studie 2 consistent ongezonde keuzes maakten. Desalniettemin voorspelde het overwegen van onmiddellijke gevolgen in beide studies het aantal gezonde keuzes. Daarnaast was het zo dat zowel het overwegen van onmiddellijke gevolgen als het overwegen van toekomstige gevolgen eetgedrag in het algemeen voorspelde (zoals in hoofdstuk 3 en 4). Hoewel consistentie in keuzes prominenter was dan variatie in keuzes over tijd, voorspelden individuele verschillen in tijdsoriëntatie en abstractieniveau desondanks voedselkeuzes en eetgedrag.

In **hoofdstuk 6**, de algemene discussie, geven we een overzicht van de belangrijkste bevindingen van dit proefschrift en bespreken we de theoretische, methodologische en praktische implicaties van deze bevindingen. Theoretisch gezien dragen de resultaten van dit proefschrift op diverse manieren bij aan een beter begrip van het construct tijdsoriëntatie en de relaties tussen tijdsoriëntatie en eetgedrag en beweging. In het bijzonder tonen we aan (a) dat tijdsoriëntatie gedragsspecifiek

is voor eetgedrag en beweging; (b) dat tijdsoriëntatie verschillend gerelateerd is aan eetgedrag en beweging; en (c) dat abstractieniveau gedeeltelijk fungeert als een onderliggend mechanisme dat deze relaties verklaart. Methodologisch gezien hebben de resultaten van dit proefschrift diverse implicaties voor het meten van tijdsoriëntatie enerzijds en het meten van eetgedrag en beweging anderzijds. In het bijzonder is het belangrijk om onderscheid te maken tussen de CFC-future en CFC-immediate subschalen bij het gebruik van de CFC vragenlijst, zich bewust te zijn van de voor- en nadelen van de verschillende manieren waarop eetgedrag en beweging gemeten kunnen worden en zich te realiseren dat het nog niet vaststaat dat de relaties tussen tijdsoriëntatie en gedragsgerelateerde constructen (zoals intenties en voorkeuren) vergelijkbaar zijn met de relaties tussen tijdsoriëntatie en werkelijk gedrag. Praktisch gezien kunnen de resultaten van dit proefschrift gebruikt worden bij het ontwikkelen van campagnes om gezond eetgedrag en beweging te stimuleren. In het bijzonder moeten ontwikkelaars van dergelijke campagnes er rekening mee houden dat aanbevelingen voor één soort gedrag gewoonlijk niet gegeneraliseerd kunnen worden naar een ander soort gedrag en dat diverse aspecten van een campagne (zoals het gebruik van tekst versus afbeeldingen) verschillende abstractieniveaus teweeg kunnen brengen, wat vervolgens de effectiviteit van de campagne kan beïnvloeden. Verder geven we suggesties voor vervolgonderzoek, bijvoorbeeld naar de domeinspecificiteit en gedragsspecificiteit van tijdsoriëntatie, de dimensionaliteit van de CFC vragenlijst, de wisselwerking tussen eetgedrag en beweging, veranderingen over tijd en langetermijneffecten, en de invloed van de omgeving.

Concluderend, het onderzoek dat is gepresenteerd in dit proefschrift biedt inzicht in de relaties tussen tijdsoriëntatie en zowel eetgedrag als beweging en draagt bij aan een beter begrip van intertemporele besluitvorming op het gebied van gezondheid. De resultaten van dit proefschrift bevestigen dat tijdsoriëntatie een gemeenschappelijke determinant is van eetgedrag en beweging. Desalniettemin zijn tijdsoriëntatie voor eetgedrag en tijdsoriëntatie voor beweging twee verschillende constructen, die op hun beurt verschillende relaties hebben met eetgedrag en beweging die gedeeltelijk verklaard kunnen worden door abstractieniveau. Uiteindelijk kunnen de inzichten die zijn verkregen in dit proefschrift gebruikt worden om gezond eetgedrag en beweging te promoten en te stimuleren.

Dankwoord

Promoveren op zich is een bezigheid die prima zou passen tussen de voorbeelden van intertemporeel gedrag die in vrijwel ieder hoofdstuk van dit proefschrift terug te vinden zijn. Het vereist niet alleen een bepaalde mate van toekomstoriëntatie, maar ook het vermogen om beloning uit te stellen. Uiteindelijk leveren de verrichte inspanningen echter een voltooid proefschrift en de bijbehorende doctorstitel op. Onderweg naar een toekomst als doctor heb ik veel meegemaakt. Een groot gedeelte daarvan is, op welke wijze dan ook, terug te zien in dit proefschrift, zoals de experimenten die ik heb uitgevoerd, de artikelen die ik daarover heb geschreven, de conferenties die ik heb bezocht, de cursussen die ik heb gevolgd enzovoorts. Dat alles geeft echter nog geen volledig beeld van de afgelopen jaren. Ik zou die namelijk ook kunnen karakteriseren aan de hand van eetgedrag en beweging. Bij eetgedrag denk ik dan vooral aan de vele koffie-, lunch- en theepauzes met collega's, maar ook aan de etentjes met medepromovendi. Bij beweging denk ik aan de (lunch) wandelingen, maar vooral ook aan de vele duizenden kilometers die ik per fiets van en naar Wageningen heb afgelegd. Uit deze voorbeelden blijkt al dat ik mijn weg als toekomstig doctor niet alleen heb afgelegd. Graag wil ik dan ook diverse mensen bedanken die, op welke wijze dan ook, een bijdrage hebben geleverd aan de totstandkoming van dit proefschrift.

Allereerst wil ik mijn promotor, prof. dr. Antonides, bedanken. Beste Gerrit, bedankt dat je me destijds de gelegenheid hebt geboden om aan een promotietraject te beginnen, maar daarnaast ook voor je begeleiding tijdens dat traject. Je was vrijwel altijd aanwezig en ik liep nooit tevergeefs bij je binnen. Daarnaast ontving ik altijd bijzonder snel feedback als ik artikelen en dergelijke naar je opstuurde. Dat is beslist niet vanzelfsprekend en daar heb ik dan ook veel waardering voor. Dank ook voor de kans die je me hebt geboden om, als tijdelijk docent, in ieder geval nog een jaar bij de leerstoelgroep betrokken te blijven. Ik hoop dat we ook na je pensionering contact zullen houden.

Daarnaast wil ik mijn copromotor, dr. Handgraaf, bedanken. Beste Michel, ook al ben je pas tegen het einde van mijn eerste jaar betrokken geraakt bij mijn promotietraject, toch voelt het nu alsof je er al vanaf het begin bij bent geweest. Ik heb vooral goede herinneringen aan de momenten waarop jij me wegwijs maakte in de academische wereld. Verder was je altijd enthousiast (vooral bij het bedenken van nieuwe experimenten) en zorgde je ervoor dat het bereiken van een mijlpaal ook daadwerkelijk een hoogtepunt werd. Bedankt voor je vertrouwen in mij!

Members of the committee, Dr Daniel Balliet, Prof. Dr Emely de Vet, Prof. Dr Job van Exel and Dr Ellen van Kleef, thank you for your willingness to judge my dissertation and to participate in the public defence.

Alle deelnemers aan de studies die zijn beschreven in dit proefschrift wil ik hartelijk bedanken voor hun medewerking. Een bijzonder woord van dank aan de docenten van diverse middelbare scholen die die mij de gelegenheid gaven één van de experimenten uit te voeren tijdens hun lessen.

Erica van Herpen en Kirsten Verkooijen, bedankt voor jullie feedback op de allereerste 'volledige' versie van mijn proefschrift. Van jullie vragen en opmerkingen heb ik dankbaar gebruik gemaakt bij het voltooien van mijn proefschrift.

Collega's van de leerstoelgroep Economie van Consumenten en Huishoudens, Johan, Pierre, Muriel, Marleen, Faith, Anouk, Simone, Ernst-Jan en Lieke, bedankt voor jullie interesse en jullie feedback op mijn werk, maar ook voor de dagelijkse koffie-, lunch- en theepauzes. Vooral aan het begin van mijn promotietraject kreeg ik op dergelijke momenten een kijkje achter de schermen en kreeg ik op die manier steeds meer inzicht in de dagelijkse gang van zaken aan een universiteit. Ook heb ik goede herinneringen aan de diverse uitjes die we als collega's hebben ondernomen. Thank you all for creating a pleasant work atmosphere!

Vera, gelukkig maak je buiten werktijd nog altijd deel uit van ons kwartet en zien we elkaar nog regelmatig bij onze gezamenlijke etentjes.

Van de student-assistenten die in de afgelopen jaren deel hebben uitgemaakt van de leerstoelgroep wil ik met name Ellin (thank you for recruiting so many participants for one of the experiments), Marije en Judith bedanken voor hun hulp bij het uitvoeren van experimenten door middel van het testen van vragenlijsten, flyeren of boodschappen doen.

Annelies en Margaret, jullie waren niet lang meer werkzaam als adjunct-beheerder en secretaresse voor de leerstoelgroep nadat ik was begonnen, maar niettemin wil ik jullie bedanken voor alles waar jullie me aan het begin van mijn promotietraject mee van dienst zijn geweest. En gelukkig zijn we elkaar daarna niet uit het oog verloren.

Karen, Dineke en Betty, bedankt voor alle praktische ondersteuning in de afgelopen jaren, maar zeker ook voor de gezelligheid tijdens de pauzes, vergaderingen en uitjes. Eén ding is zeker: zonder jullie zou er de afgelopen jaren veel minder gelachen zijn.

Promovendi van de leerstoelgroepen Marktkunde en Consumentengedrag (MCB) en Research Methodology (RME), bedankt voor de boeiende discussies en het uitwisselen van ervaringen, voor de feedback die jullie hebben gegeven op mijn artikelen en presentaties, maar ook voor de gezamenlijke etentjes. Thanks to all of you!

Geralda, Muriel, Iulian, Gohar en Jeroen, maar ook de andere leden met wie ik een kortere periode in de WASS PhD council heb gedeeld, bedankt voor de fijne samenwerking. Ik kijk met een goed gevoel terug op alles wat we bereikt en

georganiseerd hebben. De concrete taken die vaak op korte termijn moesten worden verricht, vormden regelmatig een welkome afwisseling op andere, veel abstractere bezigheden. Thank you all for the nice collaboration!

Medewerkers van de onderzoeksschool, Eveline, Esther, Stefan, Heleen en Marcella, bedankt voor de prettige contacten.

Iliana Boshoven-Gkini (AgileColor Design Studio/Atelier), bedankt voor het ontwerpen van de omslag van mijn proefschrift en de uitnodiging, stellingen en titelpagina's. Hoewel ik de lay-out van het binnenwerk graag zelf had verzorgd, heb ik er geen spijt van dat ik dit alsnog uit handen heb gegeven.

Derk van Rossem, Janneke van den Bos-Wever, Ineke Jansen en collega's (GVO drukkers & vormgevers B.V.), bedankt voor het drukken van mijn proefschrift en de begeleiding daaromheen.

Inge Joosse-Schipper (Fotograaf Inge), alvast bedankt dat je de promotieplechtigheid voor mij wilt vastleggen. Je foto's zullen ongetwijfeld een mooie, tastbare herinnering opleveren.

Muriel en Marleen, wat fijn dat jullie mijn paranimfen willen zijn en me op deze bijzondere dag terzijde willen staan!

Muriel, we hebben het grootste gedeelte van ons promotietraject samen doorgemaakt. In die jaren hebben we niet alleen veel samen gedaan (zoals cursussen volgen, conferenties en allerlei andere bijeenkomsten bezoeken), maar ook veel samen gedeeld. Ik kon altijd bij je terecht als ik iets wilde vragen, advies nodig had of hoogte- en dieptepunten wilde delen. Destijds vond ik het heel bijzonder om jouw paranimf te zijn en ik ben blij dat jij nu ook mijn paranimf wilt zijn. Fijn dat we in ieder geval voorlopig nog in hetzelfde gebouw werken, zodat we elkaar hopelijk nog regelmatig zullen zien en spreken.

Marleen, ik ben blij dat je, ondanks je tweelingzwangerschap, één van mijn paranimfen wilt zijn. We zijn tegelijkertijd begonnen aan ons promotietraject en zijn jarenlang kamergenoten geweest (ook al was dat dan maar voor een enkele dag per week). Ik heb altijd veel bewondering gehad voor hoe jij je promotietraject hebt afgelegd, terwijl het toch niet altijd eenvoudig was om dit te combineren met je baan bij het LEI. Desondanks kon ik met vragen altijd bij je terecht. Tegenwoordig zien en spreken we elkaar minder vaak, maar als we elkaar spreken, voelt het direct weer als vanouds.

Anouk, fijn dat je bereid bent om als reserveparanimf te fungeren. Ik hoop dat je niet in functie hoeft te komen als paranimf, maar het is fijn om te weten dat je klaar staat, mocht het nodig zijn. Hoewel we enkele maanden kamergenoten zijn geweest, hebben we elkaar pas echt goed leren kennen in de periode dat we samen aan het

artikel voor het special issue ter gelegenheid van de pensionering van Gerrit hebben gewerkt. Bedankt voor je belangstelling en medeleven in de laatste fase van mijn promotietraject.

Hoewel 'het verleden' in de rest van mijn proefschrift nauwelijks aan bod komt, wil ik hier graag enkele mensen bedanken die een rol hebben gespeeld bij het maken van de keuze om te gaan promoveren. Marieke Adriaanse, Eliane Dek, Iris Voornemans, Charlotte Vinkers en Denise de Ridder, de onderzoekservaring die ik bij jullie heb opgedaan (tijdens mijn bachelor- of masterscriptie, één van de interne stages of als student-assistent) en de gesprekken over jullie persoonlijke ervaringen hebben zeker bijgedragen aan mijn keuze om te gaan promoveren. Bedankt daarvoor!

Henriët van Middendorp, bedankt voor de fijne gesprekken die we hebben gevoerd en voor de kans die je me bood om het Fresh Crop Symposium tijdens de achtste Psychology and Health conferentie mede te organiseren.

Kim, bedankt voor je vriendschap in de periode dat we allebei de onderzoeksmaster Social and Health Psychology volgden. Hoewel ons contact na verloop van tijd minder is geworden, vind ik het fijn dat we elkaar toch niet helemaal uit het oog zijn verloren.

Alle (oud-)leden, de dirigente en de pianist van Young Ladies Choir Hadassah wil ik bedanken voor de mooie momenten die we samen hebben meegemaakt. Ook al heeft het niet rechtstreeks bijgedragen aan de totstandkoming van dit proefschrift, zingen zorgde in de afgelopen jaren wel voor de nodige afleiding en ontspanning. In drukke periodes gebeurde het meer dan eens dat ik me na afloop van een repetitie of concert opeens realiseerde dat ik zomaar een paar uur niet aan mijn onderzoek had gedacht. Marina, fijn dat jij mijn vaste buurvrouw bent geworden! Bedankt voor je steun bij het zingen, maar ook voor de gezelligheid tijdens de repetities en concerten.

Familie, vriendinnen en kennissen, bedankt voor jullie interesse en belangstelling in de afgelopen jaren.

Lieve papa, mama en Gercoline, bedankt voor jullie steun en voor jullie vertrouwen in mij, maar ook voor jullie hulp met allerlei praktische zaken, waardoor ik meer tijd en energie had om me op mijn onderzoek te concentreren.

Bovenal gaat mijn dank uit naar God, Die mij het verstand, de kracht en de gezondheid gaf om dit proefschrift te voltooien.

Jannette

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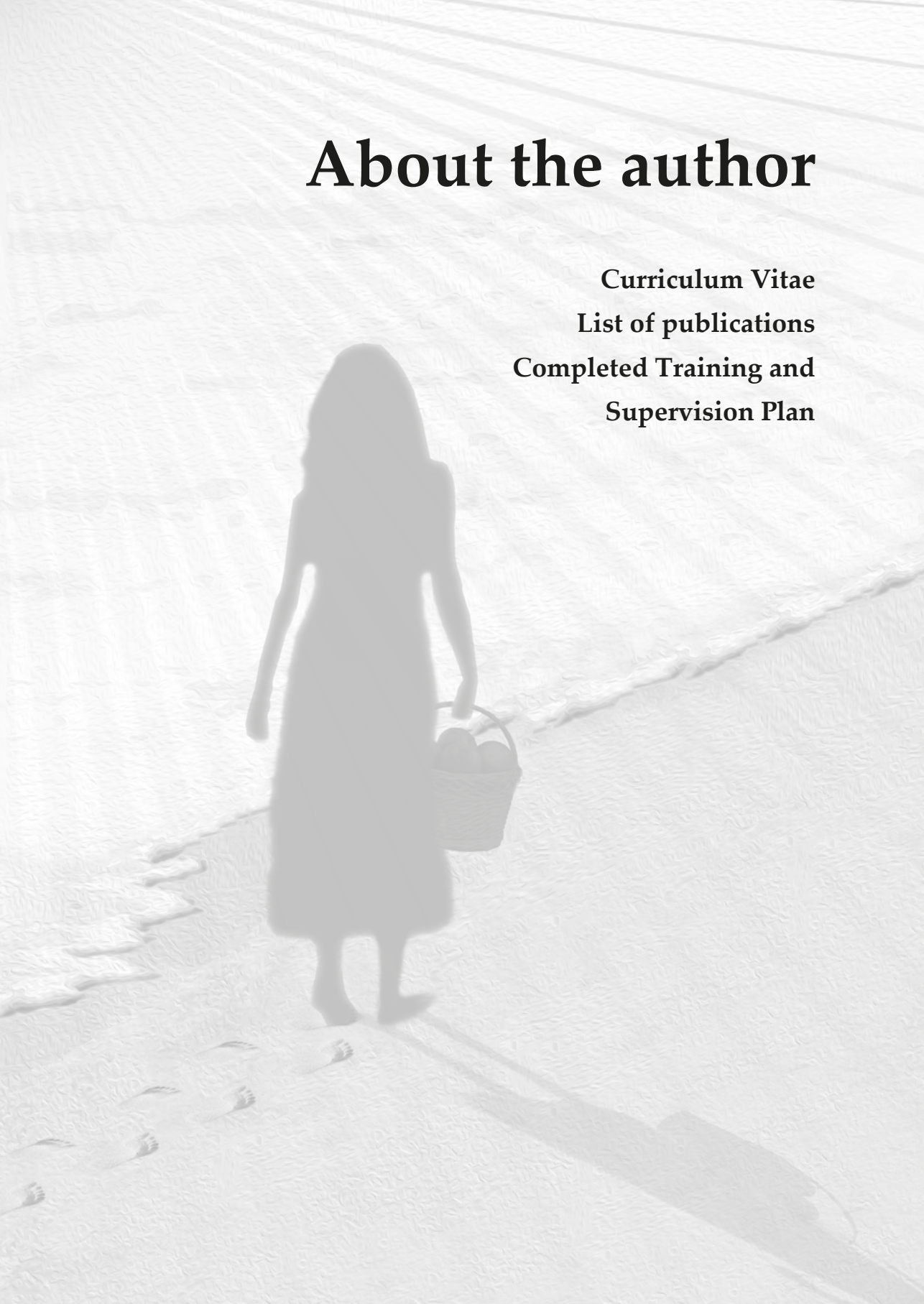

Curriculum Vitae

Jannette van Beek (1985) was born in Rhenen, the Netherlands. She attended secondary school at the Ichthus College in Veenendaal. Thereafter she studied Psychology at Utrecht University (2004–2010). During her Bachelor, she specialized in Clinical and Health Psychology as well as Methodology and Statistics and wrote a thesis on the effectiveness of implementation intentions targeted at healthy eating behavior. After obtaining her BSc degree, Jannette started with the Research Master Social and Health Psychology: Research in Behavioral Regulation at Utrecht University. In addition, she worked as a student-assistant at various Psychology departments and was co-organizer of the Fresh Crop Symposium at the Eighth Conference on Psychology and Health. Her thesis on construal level and self-control was awarded the Unilever Research Prize 2010. After obtaining her MSc degree (*cum laude*), Jannette started as PhD candidate at the Economics of Consumers and Households Group at Wageningen University (2011–2016). In addition, she was a member of the PhD council and the education committee of the Wageningen School of Social Sciences. Since August 2016, Jannette works as part-time lecturer at the Economics of Consumers and Households Group at Wageningen University.

Jannette van Beek (1985) werd geboren in Rhenen. Ze volgde voortgezet onderwijs aan het Ichthus College te Veenendaal. Daarna studeerde ze psychologie aan de Universiteit Utrecht (2004–2010). Tijdens haar bacheloropleiding specialiseerde ze zich in Klinische en Gezondheidspsychologie evenals Methodologie en Statistiek en schreef ze een scriptie over de effectiviteit van implementatie intenties gericht op gezond eetgedrag. Na het behalen van haar bachelordiploma, begon Jannette aan de onderzoeksmaster Social and Health Psychology: Research in Behavioral Regulation aan de Universiteit Utrecht. Daarnaast werkte zij als student-assistent bij diverse psychologieafdelingen en was medeorganisator van het Fresh Crop Symposium tijdens de achtste Psychology and Health conferentie. Haar scriptie over abstractieniveau en zelfcontrole werd bekroond met de Unilever Research Prijs 2010. Na het behalen van haar masterdiploma (*cum laude*), begon Jannette als promovenda bij de leerstoelgroep Economie van Consumenten en Huishoudens aan Wageningen Universiteit (2011–2016). Daarnaast was zij lid van de promovendiraad en de onderwijscommissie van Wageningen School of Social Sciences. Sinds augustus 2016 werkt Jannette als parttime docent bij de leerstoelgroep Economie van Consumenten en Huishoudens aan Wageningen Universiteit.

List of publications

Publications

van Beek, J., Antonides, G., & Handgraaf, M. J. J. (2013). Eat now, exercise later: The relation between consideration of immediate and future consequences and healthy behavior. *Personality and Individual Differences, 54*, 785–791. doi:10.1016/j.paid.2012.12.015

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (2014). Effects of time orientation and construal level on eating and exercising behavior. *Appetite, 83*, 360. doi:10.1016/j.appet.2014.06.090

Griffioen, A. M., **van Beek, J.**, Lindhout, S. N., & Handgraaf, M. J. J. (in press). Distance makes the mind grow broader: An overview of psychological distance studies in the environmental and health domains. *APSTRACT: Applied Studies in Agribusiness and Commerce*.

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (in press-a). Time orientation and construal level: Effects on eating and exercising behavior and preferences. *International Journal of Consumer Studies*.

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (in press-b). Time orientation effects on health behavior. In M. Altman (Ed.), *Handbook of behavioral economics and smart decision-making: Rational decision-making within the bounds of reason*. Cheltenham: Edward Elgar Publishing.

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (2016). *Choosing consistently: Intertemporal food choice and construal level*. Manuscript in preparation.

Presentations

van Beek, J., de Ridder, D. T. D., & Voorneman, I. M. M. (2010, May). Construal level and self-control: Ego-depletion determines whether abstract or concrete thinking benefits self-control. In **J. van Beek** & H. van Middendorp (Chairs), *Fresh Crop Symposium*. Symposium conducted at the Eighth Conference on Psychology and Health, Lunteren, The Netherlands.

van Beek, J., & de Ridder, D. T. D. (2010, November). *Construal level and self-control: Ego-depletion determines whether abstract or concrete thinking benefits self-control.* Invited presentation at the ceremony of the Unilever Research Prize 2010, Vlaardingen, The Netherlands

van Beek, J., Antonides, G., & Handgraaf, M. J. J. (2012, July). *Eating is about now, exercising is about later: Consideration of immediate and future consequences and healthy behavior*. Poster presented at the Workshop on Testing Theories of Choice Behavior, Berlin, Germany.

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (2012, September). *Eat now, exercise later: The relation between consideration of immediate and future consequences and healthy behavior.* Paper presented at the IAREP conference, Wroclaw, Poland.

van Beek, J., Antonides, G., & Handgraaf, M. J. J. (2013, May). *Eat now, exercise later: The relation between consideration of immediate and future consequences and healthy behavior.* Paper presented at the ISBNPA conference, Ghent, Belgium.

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (2013, November). *Voorkeuren voor hedonistische en utilitaire voeding en beweging over verloop van tijd. [Preferences for hedonic and utilitarian food and exercise over time].* Paper presented at the autumn meeting of the Werkgroep Voedingsgewoonten, Wageningen, The Netherlands.

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (2014, April). *Effects of time orientation and construal level on eating and exercising behavior.* Poster presented at the 38th BFDG Annual Meeting, Portsmouth, United Kingdom.

van Beek, J., Handgraaf, M. J. J., & Antonides, G. (2014, May). *Effects of time orientation and construal level on eating and exercising behavior.* Paper presented at the WASS PhD Day, Wageningen, The Netherlands.

Completed Training and Supervision Plan

Wageningen School of Social Sciences (WASS)

Jannette van Beek

Description	Department/Institute	Year	ECTS[a]
A) Project related competences			
Writing research proposal	ECH	2011	4.0
Sensory Perception and Food Preference	VLAG	2011	1.0
ECH-51306 Behavioral and Experimental Economics	ECH	2012	1.0
EDEN Doctoral Seminar on Consumer Behaviour	EIASM	2012	5.0
Masterclass Psychology of Health and Environmental Behavior: Self-Regulation and Self-Control	WASS	2014	0.5
'Eating is about now, exercising is about later: Consideration of immediate and future consequences and healthy behavior' (poster presentation)	Workshop on Testing Theories of Choice Behavior, Berlin, Germany	2012	1.0
'Eat now, exercise later: The relation between consideration of immediate and future consequences and healthy behavior' (paper presentations)	IAREP conference, Wroclaw, Poland ISBNPA conference, Ghent, Belgium	2012 2013	1.0
'Preferences for hedonic and utilitarian food and exercise over time' (paper presentation)	Werkgroep Voedingsgewoonten, Wageningen, The Netherlands	2013	1.0
'Effects of time orientation and construal level on eating and exercising behavior' (poster presentation and paper presentation)	38th BFDG Annual Meeting, Portsmouth, United Kingdom WASS PhD Day, Wageningen, The Netherlands	2014 2014	1.0
B) General research related competences			
Research Methodology: From Topic to Proposal	WASS	2011	4.0
Information Literacy including EndNote Introduction	WGS	2011	0.6
Competence Assessment	WGS	2011	0.3
Introduction to WASS	WASS	2011	0.75
Project and Time Management	WGS	2011	1.5
Techniques for Writing and Presenting a Scientific Paper	WGS	2012	1.2
Stress Identification and Management	WGS	2012	–
Effective Behaviour in your Professional Surroundings	WGS	2012	0.7

Data Management	WGS	2012	0.4
Adobe InDesign Essential Training	WUR library	2015	–
Scientific Artwork with Photoshop and Illustrator	WUR library	2016	–
C) Career related competences/personal development			
MCB/ECH/RME PhD colloquia (participating and 5x presenting)	WUR	2011–2014	3.0
Member and secretary WASS PhD council (including organization of WASS PhD Day, WASS Career Event, workshop on personal grants, and social activities; membership WASS Education Committee)	WASS	2011–2013	7.0
Correcting exams MCB-20806 Principles of Consumer Studies	ECH	2011–2012	1.5
Teaching assistant ECH-10406 Microeconomics and Behavior (formerly Economics B)	ECH	2013–2015	2.5
Total			**38.95**

Note. BFDG = British Feeding and Drinking Group; ECH = Economics of Consumers and Households Group, Wageningen University; EDEN = EIASM's Doctoral Education Network; EIASM = European Institute for Advanced Studies in Management, Brussels, Belgium; IAREP = International Association for Research in Economic Psychology; ISBNPA = International Society of Behavioral Nutrition and Physical Activity; MCB = Marketing and Consumer Behaviour Group, Wageningen University; RME = Research Methodology Group, Wageningen University; VLAG = Graduate School for Advanced Studies in Food Technology, Agrobiotechnology, Nutrition and Health Sciences; WASS = Wageningen School of Social Sciences; WGS = Wageningen Graduate Schools; WUR = Wageningen University and Research centre.
[a]One credit according to ECTS is on average equivalent to 28 hours of study load.

Colophon

Financial support from Wageningen University for printing this thesis is gratefully acknowledged.

Cover design: Iliana Boshoven-Gkini | www.AgileColor.com
Layout: Iliana Boshoven-Gkini | www.AgileColor.com
Printing: GVO drukkers & vormgevers B.V. | www.gvo.nl