CHAPTER 6

Summary and General Discussion
The capacity to exert self-control enables people to control thoughts and behavior in line with personal (health) goals (Carver & Scheier, 1981; Metcalfe & Mischel, 1999; Vohs & Baumeister, 2004). By actively exerting self-control, people are able to resist a delicious chocolate cake for dessert and have a cup of healthy green tea instead. Unfortunately, self-control resources are limited (e.g., Muraven & Baumeister, 2000; Baumeister, Vohs, & Tice, 2007).

A large number of studies has demonstrated that after an initial act of exerting self-control, people are less able or willing to exert self-control in a subsequent task; a phenomenon labeled ego-depletion (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Hagger, Wood, Stiff, & Chatzisarantis, 2010). Under conditions of ego-depletion, people frequently prefer immediately gratifying options over long term beneficial alternatives. People for instance more often choose palatable but unhealthy food products (Vohs & Heatherton, 2000) and consume more alcohol (Muraven, Collins, & Neinhaus, 2002) under conditions of low, compared to under conditions of high self-control, despite the best intentions people may have. In a state of ego-depletion, the heart beats the mind.

The overall aim of the present dissertation was to zoom in on a specific class of antecedents and a specific class of consequences of the ego-depletion effect. Specifically, in the first part of this dissertation we aspired to explore an individual difference factor preceding ego-depletion effects. We investigated whether there are individual differences in sensitivity to ego-depleting tasks and circumstances, and whether these differences in depletion sensitivity predict self-control exertion under conditions of ego-depletion. Taking a state of ego-depletion as starting point, in the second part of the present dissertation we investigated the effects of ego-depletion on self-control consequences. More specifically, we aimed to investigate the effect of the social proof heuristic on self-control outcomes in food choice behavior.

Before we discuss the conclusions and implications of our findings and future research directions, we start off with a brief summary of our findings of each empirical chapter.

**Summary of Findings**

In the first part of this dissertation, the focus was on an antecedent of self-control failure. We demonstrated that people differ in their sensitivity to ego-
depleting tasks and situations, and that as a consequence some individuals deplete their self-control resource at a faster rate than others.

More specifically, the objective of empirical Chapter 2 was to provide initial evidence for the existence of our proposed depletion sensitivity construct, and to investigate the effects of depletion sensitivity on actual self-control exertion under conditions of low self-control. In study 2.1, we developed the Depletion Sensitivity Scale (DSS) to tap individual differences in sensitivity to ego-depletion. Study 2.2 demonstrated that this scale discriminated sufficiently from other related self-control scales, such as the Trait Self-Control scale, the State Self-Control Scale and the Lay Beliefs about Willpower Scale. The final study 2.3 demonstrated an interaction effect of ego-depletion and depletion sensitivity on performance on a logical reasoning task. Compared to individuals low in depletion sensitivity, individuals high in depletion sensitivity performed worse on the logical reasoning task after exerting self-control in an initial task, indicating a stronger ego-depletion effect. Hence, these findings suggest that depletion sensitivity is a relevant concept in studying self-control processes, as it predicts self-control performance under conditions of ego-depletion.

In empirical Chapter 3 we aimed to empirically test the effect of depletion sensitivity on naturalistic observations of self-control exertion, employing the Depletion Sensitivity Scale (DSS). Dependent variables were the number of healthy and the number of unhealthy snack purchases during one week of keeping a snack diary. We demonstrated that people who are sensitive to ego-depletion bought more unhealthy food products compared to people less sensitive to ego-depletion, suggesting that depletion sensitivity affects one’s inclination to exert self-control in daily food choices. Moreover, strong weight loss goals seemed to function as a motivational buffer against the effects of ego-depletion on food purchase behavior. Whereas people with a weak goal to lose weight were found to purchase more unhealthy snacks when they were higher rather than lower in depletion sensitivity, for people with a strong goal to lose weight, there was no effect of depletion sensitivity on unhealthy snack purchases. While we should be careful in drawing firm conclusions, since the interaction was only marginally significant, this finding suggests that ego-depletion may (partly) be explained by a lack of motivation, which is in line with recent discussions of motivation being the mechanism underlying the ego-depletion effect (Inzlicht & Schmeichel, 2012; Inzlicht, Schmeichel, & Macrae, 2014). Depletion sensitivity did not predict the number of healthy snacks purchases,
which makes sense considering that buying healthy snacks may not consume as much self-control resources, compared to resisting buying of unhealthy snacks. Compared to healthy snacks, unhealthy snacks represent more of a self-control dilemma between the immediate gratification of enjoying palatable foods and the long term benefits of eating healthily (Dhar, 1997; Wang, Novemsky, Dhar, & Baumeister, 2010). Taken together, with these results we demonstrate that depletion sensitivity is a valuable factor in predicting naturalistic observations of self-control exertion in daily food purchases.

In the second part of the present dissertation, we aimed to qualify a consequence of self-control failures. We demonstrated that ego-depletion does not necessarily have to result in unhealthy choices. Impulsive food choices under low self-control conditions can be steered into the direction of healthy ones, by associating healthy food products with the heuristic of social proof.

In Chapter 4 we provided some first evidence for our theory that low self-control conditions can also increase rather than decrease healthy food choices, when heuristics are designed to promote the healthy choice. First, we demonstrated that when there is no heuristic available, people make more unhealthy choices in a hypothetical food choice task under low, compared to under high conditions of self-control. This is in line with prior research and the prevailing point of view that low self-control triggers unhealthy food choices. However, we further demonstrated that under low self-control conditions, people make more healthy food choices in the presence of the social proof heuristic, compared to when this heuristic is not available. We even demonstrated that the effect of self-control on food choice can be reversed, with a decrease in self-control leading to more rather than less unhealthy choices when a heuristic is present. Importantly, we only demonstrated these effects for food choices involving a tradeoff between a healthy, but less tasty and an unhealthy, but more tasty food item, in which we expect people to experience a self-control conflict between the goal to eat healthily and the goal to enjoy good-tasting foods.

We aimed to provide a stronger test of our theory that low self-control conditions can be beneficial for healthy food choices in the final empirical chapter, Chapter 5, by applying the heuristic of social proof in the field with a community sample. We manipulated self-control and the heuristic of social proof in a challenging supermarket setting where people make real choices and where actual food
temptations and influence techniques towards other attractive (but often unhealthy) products are available. We demonstrated that when the social proof heuristic was associated with a healthy food product in the supermarket, people (marginally significantly) more often chose this product under low self-control conditions, compared to when this heuristic was not available. Under high self-control conditions we found no such effect. What is more, for one of the first times we revealed an ego-depletion effect outside the lab, providing more insight into the strength and robustness of the ego-depletion effect.

Taken together, with the present dissertation we shed light on factors predicting ego-depletion effects and on subsequent self-control outcomes. In line with recent discussions on the ego-depletion effect (Inzlicht & Schmeichel, 2012; Inzlicht et al., 2014), we demonstrated that ego-depletion is not an all-or-nothing phenomenon to which everyone is equally sensitive, but that it rather depends on individual factors. We demonstrated that there are individual differences in sensitivity to depletion that predict self-control exertion under conditions of ego-depletion. Furthermore, and contrary to the predominant view on the negative consequences of self-control failures (De Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012; Friese & Hofmann, 2009; Hernandez, & Diclemente, 1992; Tangney, Baumeister, & Boone, 2004), the findings suggest that the effects of ego-depletion on self-control outcomes do not need to be negative. We demonstrated that the consequences of self-control failures depend on the environment in which one exerts self-control. When heuristic cues in the environment point towards beneficial self-control outcomes, conditions of ego-depletion may lead to goal directed behavior. All in all, with the present findings we contribute to recent insights on what ego-depletion entails, and to insights on the negative consequences for health behavior, which may be less robust than has been assumed up to now.

**Theoretical Implications**

**Individual differences in depletion sensitivity**

In the past decades, the effects of ego-depletion have been demonstrated in a wide range of behaviors with a variety of ego-depleting tasks and measures (e.g. Duckworth & Kern, 2011; Hagger et al., 2010). Over 100 studies demonstrated the ego-depletion effect (Duckworth & Kern, 2011; Hagger et al., 2010), providing convincing evidence for this phenomenon.
Previous research also found factors that moderate the ego-depletion effect, such as one’s level of motivation for a certain task (Murvaven & Slessareva, 2003; Sato, Harman, Donohoe, Weaver, & Hall, 2010), prior experience with a task (Muraven, Baumeister, & Tice, 1999) and beliefs in ego-depletion (Job, Dweck, & Walton, 2010). In line with these studies, our research on depletion sensitivity demonstrates that the ego-depletion effect may not be an all-or-nothing phenomenon that equally affects self-control behavior for all individuals. We showed that not everyone is equally sensitive to deplete their self-control resource, but that there are rather individual differences in the speed with which one’s self-control resources are drained.

Recently, the mechanism underlying the ego-depletion phenomenon has been topic of debate. With our current work on depletion sensitivity we contribute to this recent debate on the question what ego-depletion exactly entails. It has been suggested that instead of being a consequence of a limited cognitive resource, the ego-depletion effect can be explained by a shift in motivation and attention from goals one has to pursue to rewards one wants to attain (Inzlicht & Schmeichel, 2012; Inzlicht et al., 2014). Our research on depletion sensitivity also provides an indication about what ego-depletion entails. In empirical Chapter 3 we demonstrated that the effect of depletion sensitivity on the amount of unhealthy snacks bought was more pronounced for people with a weak, compared to people with a strong goal to lose weight. Whereas people with a weak goal to lose weight purchased more unhealthy food products when they were higher in depletion sensitivity, for people with a strong goal to lose weight there was no such effect of depletion sensitivity on the amount of unhealthy products bought. These findings suggest that a strong goal to lose weight may function as a buffer against self-control failures. If ego-depletion would be totally capacity driven, weight loss goals should not play a role in the effect of depletion sensitivity on the exertion of self-control. However, the fact that weight loss goals do play a role here suggests that one’s ability to exert self-control may indeed be (partly) motivational.

Effortless healthy eating by means of the social proof heuristic

It has frequently been assumed that people need sufficient self-control resources to be able to transcend the lure of the here and now and make adaptive, goal-directed choices. Low self-control conditions have indeed been frequently associated with subsequent self-control failures (Baumeister et al., 1998; Hagger et
al., 2010; Vohs & Heatherton, 2000). In contrast to this prevailing view on self-control exertion as an effortful strategy, our studies on social influences on self-control consequences in Chapters 4 and 5 suggest that of low self-control conditions are not necessarily bad for health outcomes. Rather, by associating the social proof heuristic with healthy food products, people can be subtly steered towards making healthy food choices under low self-control conditions. With this, we demonstrate that people do not need to exert self-control to make healthy food choices that are adaptive in the long run. We show that beneficial outcomes in food choice behavior can be achieved effortlessly.

With the present dissertation we contribute to new lines of research on effortless self-control. These lines of research likewise suggest that effortless choices, without the exertion of self-control, can be healthy ones. Related research on the concept of nudges for instance, suggests that by small changes in the environment, people can be steered towards healthy behaviors (Wansink, 2004). For instance, when palatable snack foods are placed at a further distance, people eat less of these snack foods, compared to when they are placed closer to people (Maas, de Ridder, de Vet, & de Wit, 2012). Moreover, cues in the food environment, such as the size of one’s plate, or the size and shape of prepackaged products, influence how much people eat; people eat less when they eat from smaller plates or buy smaller packages (Wansink, 2004). Furthermore, low self-control may also lead to beneficial health outcomes when people possess adaptive habits. Habitual healthy food choices do not consume self-control resources, as habits are mental constructs that automatically trigger behavior (e.g. eating healthily) in response to a certain cue or situation (e.g. lunch time; Neal, Wood, & Drolet, 2013). Similarly, the social proof heuristic leads people towards healthy food choices by one simple rule, making the exertion of self-control unnecessary.

Our findings on the influence of social proof under low self-control conditions suggest that the effects of other ‘mindless’ cues or subtle influence techniques, such as nudges and habits, may also be more pronounced under conditions of ego-depletion. Under low self-control conditions, people have the tendency to base their decisions on simple decision rules (Fennis, Janssen, & Vohs, 2009; Janssen, Fennis, Pruyn, & Vohs, 2008; Pohl, Erdfelder, Hilbig, Liebke, & Stahlberg, 2013). These simple rules can be heuristics, like in our research, but can possibly also be other environmental or personal cues, such as nudges or habits. In line with this
proposition, habits have indeed been found to especially influence behavior (positively as well as negatively), when self-control resources are low (Neal et al., 2013). Moreover, following a nudge is, similar to heuristics, assumed to be a form of impulsive behavior (Lades, 2014), and therefore are presumably particularly effective in influencing behavior under low self-control conditions.

The present studies in Chapter 4 and 5 on environmental influences on self-control outcomes also suggest that ego-depletion effects should not be studied in a social vacuum. Ego-depletion effects have often been demonstrated in the lab, with dual tasks paradigms demonstrating the effects of exerting self-control in a first task resulting in diminished performance in the subsequent task. However, the present research demonstrates that social proof cues pointing towards long term beneficial outcomes can nullify the negative effects of ego-depletion on food choice behavior. By all means, in daily life many cues and heuristics are available that may point towards immediately gratifying or long term beneficial choices. This highlights the relevance of studying the influence of the environment on self-control exertion.

With the present research we build on and extend the literature on heuristic decision making. Up to now, heuristics such as the social proof heuristic or the consistency heuristic, referring to the felt need to go through with something once feeling committed to it (Cialdini, 2009), have been found to promote various behaviors, such as sustainable behavior or health related behaviors (Fennis et al., 2009; Goldstein, Cialdini, & Griskevicius, 2008). For instance, research demonstrated that the social proof heuristic is effective in influencing towel reuse in hotels (Goldstein et al., 2008) and that the heuristic of consistency increases students willingness to keep a health and food diary (Fennis et al., 2009). However, in these behaviors, the tradeoff between immediate gratification of an attractive option and long term benefits of the judicious option is less salient than in food choice behavior. Throwing one’s towel on the floor instead of reusing it, or not keeping a health and food diary, is presumably not as tempting on the short term, compared to the immediate gratification of enjoying palatable foods. With the present research we demonstrate that the social proof heuristic can override acting in line with this immediate temptation under low self-control conditions. Future research on heuristics should take into account whether the studied behavior includes a tradeoff, and, more importantly, future studies should investigate whether other heuristics than the social proof heuristic are likewise sufficiently strong to promote long term
beneficial behaviors in tradeoff choices, when attractive short term temptations are available.

Furthermore, descriptive social norms, describing what most others do (Cialdini, Reno, & Kallgren, 1990) can be considered a form of social proof (Stok, De Ridder, De Vet, & De Wit, 2013). Research on descriptive social norms demonstrated that people perform more (or less) healthy eating behaviors when they believe others in their environment to eat healthily (or unhealthily; e.g. Burger et al., 2010; Stok, De Vet, De Wit, & De Ridder, 2014). For instance, research with adolescents, who are especially sensitive to group influences, demonstrated that when a descriptive norm communicated that the majority of one’s peers eats sufficient fruits, adolescents consumed more fruits, compared to when this norm was not available (Stok et al., 2013). This research likewise suggests that social proof is an important factor in influencing food choices. Importantly, with the present dissertation we demonstrate what the role of self-control is in the effect of social proof on food choice behavior. Importantly, the social proof heuristic is mainly effective in influencing self-control outcomes under conditions of low self-control, when people would otherwise be inclined to prefer the good-tasting option that provides immediate gratification (Kahan, Polivy, & Herman, 2003; Vohs & Heatherton, 2000).

Taken together, the present dissertation contributes to literature on self-control, heuristic decision making and social norms, and the impact of subtle influence techniques on self-control behaviors.

**Limitations**

Some limitations of the present dissertation must be noted. In the first place, we should be careful in drawing firm conclusions about the beneficial effects of social proof on food choices under conditions of low self-control. We only found the social proof effect twice, once in the lab, and once in a more naturalistic supermarket setting. Moreover, in the supermarket setting, the effect of social proof under low self-control conditions was only marginally significant. Future studies should replicate this finding in order to be able to conclude with more certainty that social proof affects food choice behavior under low self-control conditions.

Whereas we successfully manipulated ego-depletion in three of our studies, our ego-depletion manipulation (by means of the E-erasing task; Baumeister et al., 1998) also failed once (Salmon, Fennis, Adriaanse, De Vet, & De Ridder, 2014;
internal report), underlining the difficulty of successfully manipulating ego-depletion effects (see Carter & McCullough, 2014, and Hagger & Chatzisarantis, 2014, for recent discussions on the strength and robustness of the ego-depletion effect). Alternatively, other manipulations that diminish cognitive capacity can be used to create a mindless state in which people rely on heuristic decision making. Cognitive load manipulations or manipulations of time pressure for instance, can also be used to manipulate a lack of cognitive resources (e.g., Ferrari, 2001; Gilbert, Giesler, & Morris, 1995; Shiv & Fedorikhin, 1999).

Another limitation concerns the fact that our research on the effects of social proof on food choices under low self-control conditions was restricted to one single decision moment. Therefore, we do not have any information about the effects of social proof on subsequent food choices. It could be that making one healthy choice has positive spillover effects on subsequent food choices. For instance, after choosing a healthy salad, one may not want to jeopardize healthy eating goals by taking a chocolate cake for dessert. On the other hand, people may also balance their healthy eating and enjoying palatable food goals, and consequently use a healthy food choice as a license to subsequently indulge in unhealthy foods (De Witt Huberts, Evers, & De Ridder, 2012). Whether people repeatedly restrain themselves or will balance their goals may depend on whether people view their food choices in isolation, or as a set of decisions (e.g., Ainslie & Monterosso, 2003, Kudadjie-Gyamfi & Rachlin, 1996). When people view their food choices as one set of decisions, restricting oneself in a first food choice may lead to goal balancing, and indulgence in the next choice, whereas when people view food choices in isolation and experience each food choice as a single decision moment, they may adhere to the same goal of for instance eating healthily, and make a range of healthy food choices.

Furthermore, we do not have any information about the long term effects of the social proof heuristic. We did not investigate whether people keep purchasing a healthy product after the social proof heuristic once steered them subtly towards that product. When people once made a healthy choice in the presence of the social proof heuristic, this may imply that when this heuristic is removed, people stop making this healthy food choice. On the other hand, when people are influenced by the social proof heuristic multiple times, buying the healthy product may become a habit that keeps influencing food choice behavior mindlessly (Neal et al., 2013; Verplanken, 2006; Verhoeven, Adriaanse, Evers, & De Ridder, 2012). Future research should...
study the effects of heuristic decision making on multiple subsequent food choices in the short and in the long run.

The studies in the present dissertation demonstrated the effectiveness of only one type of heuristic. Since the current effects may also hold for other heuristics, future research should investigate whether other heuristics are similarly effective in influencing food choices under low self-control conditions. We conducted two initial studies applying the scarcity heuristic, referring to the need to acquire what is scarce (Cialdini, 2009; Worchel, Lee, & Adewole, 1975). Similar to our studies on the social proof heuristic, we investigated whether this heuristic was effective in influencing food choices under low self-control conditions (Salmon et al., 2014; internal report). Nevertheless, we failed to find such effects. A possible explanation for this lack of effectiveness could be that participants in our study perceived the scarcity to be supply scarcity instead of demand scarcity. Importantly, supply scarcity (e.g. ‘limited edition’) seems to be less effective in influencing purchases of non-conspicuous consumption products, such as daily food products (Gierl & Huettl, 2010), compared to more visible consumption products, such as fashion products. Demand scarcity (e.g. ‘many items sold, only a few units remain’) on the other hand, could be more effective in influencing food choices, since this form of scarcity basically represents a form of social proof, by suggesting a product is scarce because many people bought it (Gierl & Huettl, 2010; Parker & Lehmann, 2011).

It can even be suggested that in order for supply scarcity to influence behavior, some extent of cognitive elaboration is needed. The influence of the scarcity heuristic on purchase intentions is mediated by value perceptions of the product (Eisend, 2008). This suggests that the supply scarcity heuristic could be a more deliberate rule than for instance the social proof heuristic. Moreover, people are aware of their sensitivity to the scarcity heuristic (Eisend, 2008), many people for instance know they want to have the last hotel room available on a booking site, or a limited edition of a specific pair of jeans. This may suggest that the supply scarcity heuristic affects behavior via a less impulsive, and less ‘mindless’ mechanism, compared to for instance the social proof heuristic. Consequently, the role that self-control plays in the influence of the scarcity heuristic may be different from the role it plays in the effectiveness of social proof. Whereas social proof is more effective under conditions of low, compared to high self-control, one may expect the (supply) scarcity heuristic
to be most effective in influencing behavior under high self-control conditions, when people have sufficient cognitive resources available.

**Practical Implications**

Healthy eating starts by making healthy food choices at point-of-purchase settings. At these settings, the social proof heuristic can be applied relatively easily, by showing information about others’ behavior. Rather than radically changing the food environment by for instance putting taxes on unhealthy foods, or banning unhealthy foods from the environment (Faith, Fontaine, Baskin, & Allison, 2007), we contend that healthy foods can be promoted by means of this relatively simple strategy. In our field study at the supermarket, we applied the social proof heuristic by using banners that contained majority information. Using shelf banners at point-of-sale is already common practice in retail environments, underlining the relatively easy implementation of this technique. These findings on the influence of social proof on long term beneficial behaviors could also be of relevance in other situations in which people need to exert self-control to act in line with long term goals and resist the immediate gratification of temptations. One can for instance think of promoting sustainable behaviors by applying social proof cues, such as suggesting that the majority of people go to work by bike instead of car.

Heuristics such as the social proof heuristic are most effective in influencing behavior under conditions of low self-control. When applying the social proof heuristic in health interventions in daily life, natural conditions of low self-control can be exploited. At several moments of the day and in certain situations, people are likely to be low in self-control resources. For instance at the end of a working day, at the end of the week, after a tedious meeting or boring lecture, or after people made a range of choices (Vohs et al., 2008), such as at the cashiers of a supermarket or any other large store. These could be suitable moments to apply the social proof heuristic to subtly influence people towards healthy choices.

Importantly, heuristics should be applied ethically. Information presented by social proof (or other) heuristics should be based on true facts. Since people in many instances favor unhealthy food products (e.g. Briefel & Johnson 2004), marketers should invent creative ways of communicating social proof while avoiding to deceive people. An important next step in research on the social proof heuristic will be to identify and evaluate strategies to communicate social proof information in the
marketing of healthy foods, that do contain correct or ‘real’ information. We do see multiple opportunities to manipulate the social proof heuristic by presenting correct information. For example, social proof information could relate to a relative number of individuals buying the product. Instead of stating that ‘most consumers in this supermarket bought this cheese’, one could state that ‘growing numbers of consumers chose low-fat cheese’ (if that actually represents correct information). Social proof messages can also be framed differently, for instance by mentioning absolute (large) sales numbers, such as ‘this week 3000 people bought [product A]’, or for instance calling a certain product ‘popular product in this supermarket’, suggesting that (many) people (though not necessarily the majority) buy this product. Alternatively, social proof heuristics may also be more subtly embedded in the physical environment, by for instance leaving empty wrappers of a particular product (Prinsen, De Ridder, & De Vet, 2013) or varying in supply on shelves (Parker & Lehmann, 2011). Future research should investigate whether these and other social proof manipulations can be manipulated reliably within ethical boundaries.

The studies in the first part of this dissertation demonstrate that people differ in their sensitivity to ego-depleting tasks and circumstances, and that as a consequence some people are less able to repeatedly exert self-control compared to others. These findings suggest that depletion sensitivity is a relevant concept in studying self-control processes. In future research on self-control effects, individual differences in depletion sensitivity can be taken into account by applying the Depletion Sensitivity Scale.

**Suggestions for Future Research**

The results of the present dissertation suggest that a) people differ in their sensitivity to ego-depletion and b) people can be influenced towards healthy food choices under conditions of ego-depletion by means of the social proof heuristic. A research question logically following from these findings is whether people who are sensitive to ego-depletion are consequently also more often influenced by heuristics. People who are sensitive to ego-depletion are expected to more often find themselves in a state of ego-depletion, compared to people who are less sensitive to ego-depletion. As a consequence, in daily life, chances are presumably higher that these depletion sensitive individuals will be influenced by the social proof heuristic, since they experience low self-control conditions more often. Importantly, these people
who are high in depletion sensitivity may be precisely the people who need a subtle push to choose healthy food choices that are beneficial on the long term.

The studies in the first part of this dissertation demonstrated that depletion sensitivity predicts the exertion of self-control. Yet, we lack insight in the underlying mechanism via which depletion sensitivity affects behavior. Recent discussions on the mechanism underlying ego-depletion affect our theorizing about how depletion sensitivity affects behavior and how people can be trained to become less depletion sensitive. Whereas in the original ego-depletion paradigm, the limited self-control resource is explained by a limited cognitive capacity, recently, a potential complementing framework has been proposed that can add to our understanding of self-control. The opportunity cost model of subjective effort and task performance suggests that people will only exert effort when the benefits of exerting effort outweigh the costs (Kurzban, Duckworth, Kable, & Myers, 2013). In line with this recently proposed model, recent insights suggest that the ego-depletion effect could be explained by a lack of motivation (Inzlicht & Schmeichel, 2012; Inzlicht, et al., 2014). Instead of not being able to repeatedly exert self-control, people may not want to exert self-control repeatedly. After an initial act of exerting self-control, attention may shift from goals one has to pursue to rewards one wants to attain. Possibly, rather than depletion sensitivity representing one’s ability to keep exerting self-control, it may rather represent one’s motivation to keep exerting self-control. If so, depletion sensitivity may be negatively related to personality measures such as conscientiousness or perfectionism, representing one’s motivation of being thorough and performing tasks well (Enns & Cox, 2002; George & Zhou, 2001; Goldberg, 1992). Consequently, increasing one’s motivation to perform well should be a primary aim of interventions aimed at decreasing depletion sensitivity and preventing ego-depletion effects.

We expect the Depletion Sensitivity Scale to tap the repetitive nature of self-control exertion. That is, depletion sensitivity represents one’s ability to exert self-control after exerting self-control in an initial task. So, we expect depletion sensitivity to predict actual repeated self-control exertion. However, in the present chapters on depletion sensitivity, self-control exertion was measured at a single point in time, either under conditions of ego-depletion or not. Future studies should investigate whether one’s performance on a range of self-control tasks is moderated by one’s level of depletion sensitivity.
Individual differences in trait self-control may affect self-control performance in a different way than state self-control resulting from ego-depletion conditions (De Ridder et al., 2012; Gillebaart & De Ridder, 2015). Ego-depletion seems to weaken one’s ability to actively exert self-control in terms of overriding or inhibiting predominant impulsive tendencies. Trait self-control however, seems to represent adaptive habits and self-regulation strategies, and may therefore rather represent the *avoidance* of active self-control exertion (De Ridder et al., 2012; Gillebaart & De Ridder, 2015). In line with this novel model of self-control, trait self-control in Chapter 2 did not predict performance on a cognitive reasoning task under conditions of ego-depletion, whereas depletion sensitivity predicted active self-control exertion. In contrast to depletion sensitivity predicting one’s ability to repeatedly exert self-control, we expect trait self-control to predict more static, single cases of self-control exertion, independent of whether people initially exerted self-control or not. Trait self-control has for instance been found to predict academic success as measured by GPA, or (less) binge eating symptoms, as measured by a questionnaire on eating disorder symptoms (Tangney et al., 2004). Hence, whereas state self-control seems to represent the ability to actively exert control over one’s behavior, trait self-control may rather represent adaptive habits and self-regulation strategies, rendering active self-control exertion unnecessary. Future studies should provide more insight into the nature of trait versus state self-control.

A next step in research on the effectiveness of heuristics in eating behavior is to investigate what a heuristic should look like to influence healthy food choices. In other words, what aspects should a heuristic have in order to override the impulse to eat a palatable but unhealthy food product, and choose a healthy product instead? Based on previous research that demonstrated the potential of social influence heuristics to influence behavior, such as social proof, reciprocity or authority (Cialdini, 2009), one could argue that heuristics should link to an evolutionary adaptive, hard-wired social tendency. The heuristic of social proof for instance, referring to the tendency to follow the majority, is based on the human need to belong to a group (Cialdini, 2009), which is an adaptive tendency from an evolutionary perspective. Furthermore, other social influence heuristics such as the authority heuristic (‘follow the leader’; Cialdini, 2009), or the reciprocity heuristic (‘give and take’; Cialdini, 2009) are similarly based on tendencies that benefit belonging to a group. Since these social influence heuristics may be hard-wired, the
need to follow these heuristics may be stronger than the impulse towards eating an attractive, but unhealthy food product. On the contrary, heuristics that particularly hinge on other decision rules may not be adept at overriding impulses towards food temptations. The default heuristic for instance, which suggests that ‘if there is a default do nothing about it’ (Gigerenzer, 2008), may not be adept at overriding the temptation of a palatable, but unhealthy option. This heuristic has no underlying adaptive social motive (such as belonging to a group) that may be stronger than the impulse towards the tempting food. Insights into what components a heuristic should be built on, will provide more insight into which heuristics are effective in influencing healthy food choices and which are not.

Throughout the present dissertation, we suggest that the social proof heuristic influences food choice behavior mindlessly. Or, at least we presume that one does not need sufficient cognitive resources to follow this heuristic. Future research should however point out to what extent influence heuristics such as the heuristic of social proof are truly mindless. Heuristics are presumably not as mindless as for instance a behavioral prime, which may steer behavior unconsciously (e.g., Bargh & Chartrand, 2000). Heuristics still require a simple decision rule that needs to be followed (Shah & Oppenheimer, 2008), suggesting there is at least some cognitive activity involved. Nevertheless, heuristics could be mindless to the extent that people will not cognitively elaborate on a heuristic. We even expect heuristics to be ineffective when people cognitively elaborate on a heuristic, which may (partly) explain why under conditions of sufficient self-control, the heuristic of social proof did not influence food choice behavior. In an initial study on the effectiveness of the scarcity heuristic, we aimed to examine whether this heuristic is still effective when people have to provide a reason for their decision (internal report, Salmon et al., 2014). We expected that providing a reason for one’s food choice would diminish the effectiveness of the heuristic. Unfortunately however, the scarcity heuristic appeared to be ineffective in influencing food choices, so we were unable to test whether providing a reason would nullify the effectiveness of a heuristic. Future studies should find out to what extent the effectiveness of a heuristic is dependent on a limited amount of cognitive elaboration.
Concluding Thoughts

With the findings of the present dissertation we highlight the role of individual differences in depletion sensitivity, and we qualify the consequences of ego-depletion for food choice behavior. We conclude that people differ in their sensitivity to depleting tasks and circumstances, and that consequently some people are less able to exert self-control under conditions of ego-depletion than others. High depletion sensitivity is related to less beneficial self-control consequences. People who are sensitive to depletion bought more unhealthy food products compared to people less sensitive to depletion. These low levels of self-control are however not necessarily disadvantageous for self-control consequences. Low levels of self-control were used to benefit adaptive long term behaviors. By exploiting heuristic decision tendencies under low self-control conditions, we influenced people towards making healthy food choices that are beneficial in the long term. In sum, this suggests that what the heart wants, impulsively following the heuristic, could be what the mind thinks is wise after all.