The moderating role of task aversiveness on the relation between trait self-control and study behavior

Master thesis

Annabel Soons

3991822

Master thesis Clinical Psychology & Health Promotion

Track Health Promotion

Supervisor: Marleen Gillebaart

Utrecht University

02-07-2017

Amount of words: 6442

Universiteit Utrecht

Table of contents

1. Abstract

Who wouldn't want to know how to be successful in academic performance, well-being, health and relations? One of the key factors to success in life is trait self-control, but the underlying processes of self-control success remain unexplored. Trait self-control is defined as the ability to inhibit immediate impulses to attain a long-term goal. The current paper investigates the relation between trait self-control and study behavior and the main focus was on the moderating role of task aversiveness. This task aversiveness is defined as how unpleasant or unenjoyable it is to perform a task. It was expected that trait self-control positively predicted study behavior. Furthermore, a moderating role of task aversiveness on the relation between trait self-control and study behavior was predicted. It was proposed that task aversiveness is an aspect that diminishes study behavior, but chiefly for people with low trait self-control. Trait self-control, task aversiveness and study behavior were assessed in a short-term longitudinal study (N=187) and results showed that trait self-control indeed predicted study behavior. Unexpectedly, non-significant moderating effects were found. However, results showed that task aversiveness influences study behavior for people with low trait self-control, but not for people high in trait self-control. These findings contribute to knowledge of the underlying processes of self-control success. Future research could focus on a more heterogeneous sample with fluctuating scores on trait self-control and investigate other behavior for which self-control is needed.

Keywords: trait self-control, study behavior, task aversiveness, task aversiveness manipulation

2. Introduction

Who wouldn't want to know how to be successful in academic performance, well-being and relations? We all know that talent and opportunity are key factors to success. However, even people with commensurate levels of talent and opportunity experience diverse levels of success. Therefore, a much-debated question in the field of psychology is what makes some people more successful than others, regardless of differences in talent and opportunities. Duckworth and Gross (2014) state that self-control is an important determinant. It happens time after time: choosing an apple in lieu of eating an ice cream, studying instead of hanging out with friends, going to the gym rather than watching television. These are examples of situations in which people need to use self-control. Self-control is defined as the ability to inhibit immediate impulses to attain a long-term goal (Adriaanse, Kroese, Gillebaart & De Ridder, 2014). "It enables a person to restrain or override one response, thereby making a different response possible" (Baumeister, Vohs & Tice, 2007, p. 351). This self-control is highly adaptive and empowers people to behave in ways that are necessary to achieve their long-term desirable outcomes. For example, imagine a woman who wants to eat healthier. At breakfast she needs to use self-control to choose for oatmeal instead of a donut, bagel or sweet cereal. The advantages of eating oatmeal are postponed in time, while the disadvantages are immediate: oatmeal might not be as appealing as the taste of a bagel. However, choosing to eat oatmeal is more gratifying over the long run and contributes to her long-term desirable outcome of eating healthier. Having a high level of self-control is relevant to most behaviors for a successful life (Tangney, Baumeister & Boone, 2004) and therefore it is important to have insight in why some people are more successful in performing self-control than others.

When a situation occurs where self-control is required, individuals need to choose between an immediate temptation and a more sensible alternative, which contributes to the achievement of a long-term goal. When self-control fails, people seem to concede to these immediate temptations, instead of staying in line with their goals and values, despite their best intention not to (Fujita, 2011). One potential reason for this might be that people choose for prompt rewards, as these are much more certain compared to the delayed rewards of long-term achievements (Kuijer, De Ridder, Ouwehand, Houx & van den Bos, 2008). Because of the importance of self-control for success in life, it became the focus of a substantial part of psychological research. The purpose of current study is to gain insight in the association between self-control and long-term directed behavior that can contribute to success in life. To understand this association, two theories of self-control will first be explained.

There are numerous theories and models that have shed light on self-control. Most theories acknowledge that self-control facilitates both the promotion of wanted behavior and the inhibition of unwanted behavior to the same extent. Furthermore, many theories described self-control as a competence that contributes to efficient functioning (De Ridder, Lensvelt-Mulders, Finkenauer, Stok & Baumeister, 2012). The best-known model is the self-regulatory strength model of self-control. This model focuses on the idea of ego depletion: people tend to fail at self-control when recent usage of their self-control has depleted their resource (Muraven & Baumeister, 2000). When this limited source of self-control is depleted, it results in decreased capacity for further self-regulation leading to deteriorated performance on acts of self-control. Inzlicht and Schmeichel (2012) suggest a novel perspective on this model. They imply that self-control depletion is an outcome of changes in motivation and attention rather than a consequence of lost self-control resources. With collateral shifts in motivation and attention towards reward-relevant cues, individuals exert less control and become susceptible to the possibility of rewards.

Another common used theory is the hot-system/cold-system framework. Metcalfe and Mischel (1999) suggest two types of processing, whereby rational, complex and slow considerations are made by the cool cognitive system/known-system and wherein the hot emotional system/go-system is a more reflexive, fast system, specialized in quick response on the basis of emotions. They illustrate that interaction between these two systems yields an individual's response to extrinsic stimuli and makes self-control succeed or fail. Self-control is mostly seen as part of the cool-system that maneuvers goal-directed volition and demands a person's willpower to be efficacious (De Ridder et al., 2012). However, when the hot-system overrides the cold system, it leads to impulsive and immediate responses.

To elucidate on which type of self-control this study will focus, it is important to distinguish two types of self-control, namely *state* self-control and *trait* self-control. The previously mentioned theories mostly focus on state self-control rather than trait self-control, because of their situationally focused contexts. This state self-control differs across situations and time, while trait self-control is a stable personality trait that characterizes the individual persistently across situations and time (Tangney et al., 2004; De Ridder et al., 2012). Observed individual differences in self-control are suggested to be reflections of a stable trait (Mischel & Ayduk, 2004). Studies demonstrate that trait self-control predicts the performance of self-control related behavior (De Ridder et al., 2012) and therefore, in current research we will focus on trait self-control rather than state self-control.

The underlying processes of self-control failure have been investigated very often, while these processes for self-control success remain uncharted (Gillebaart, Schneider & De Ridder, 2012). However, self-control is an important key to success in life (Baumeister et al., 2007) and since it is beneficial in numerous ways, it is important to gain more insight in these underlying processes. It predicts better academic performance and higher income (Galla & Duckworth, 2015) and people high in trait self-control descry greater well-being and have better interpersonal relations (De Ridder et al., 2012). Furthermore, people high in trait self-control are better in regulating their emotions, thoughts and impulses, contrasting to people with low trait self-control (De Ridder et al., 2012). Moreover, studies show that trait self-control is important to adapt the self to generate a better and more optimal fit between the self and the world (Tangney et al., 2004). By controlling one's own responses, a person will stay in line with his ideals, norms and values. Contrasting to these profitable outcomes, a lot of behavioral and social problems stem, directly or indirectly, from self-control deficiency (Hagger, Wood, Stiff & Chatzisarantis, 2010). Low trait self-control is linked to unhealthy eating, shortfall in exercise, delinquent behavior and substance abuse (Hofmann, Luhmann, Fisher, Vohs & Baumeister, 2014). Furthermore, it has been associated with behavior- and impulse-control problems, failure at task performance, relationship- and academic problems (Baumeister et al., 2007).

Studies show that high trait self-control is related to benefits in many fields of human functioning and some of the strongest effects of trait self-control were found in academic performance (De Ridder et al., 2012). Having high trait self-control as a student seems to be profitable on multiple levels: students with better trait self-control were more capable to comply with academic goals (Galla & Duckworth, 2015) and they had higher grades than people low in trait self-control (Tangney et al., 2014). Duckworth and Seligman (2005) found that intelligence might be less important than trait self-control in study performance. Their findings indicate that failure of exploiting trait self-control is the major reason for students' inadequate academic capability. Additionally, self-control was the only factor that predicted grade point average among university students (Wolfe & Johnson, 1995). Furthermore, students higher in trait self-control had stronger habits for studying compared to people low in trait self-control. These habits foresee structure to daily life and therefore ensure students to adhere to their long-term goals (Galla & Duckworth, 2015).

There is still no reasonable explanation for what the underlying processes of self-control success are and why people high in trait self-control are so successful in performing self-control related behavior. If we gain more knowledge into these processes, it can be useful

for helping people to be more successful in life. This insight is important since, unfortunately, not everyone is allocated a high level of trait self-control. Research has shown that low trait self-control is associated with procrastination (Kroese & De Ridder, 2015). Procrastination is defined as the inclination to postpone the initiation or completion of a goal to the point of experiencing discomfort (Krause & Freund, 2014). It has been reported within everyday settings and seems to be a problem among college students, as 95% of students procrastinate (Onwuegbuzie & Collins, 2001). Academic procrastination on tasks is disadvantageous on different levels. It often leads to poorer performance and lower grades (Tangney et al., 2014) and has been associated with depression, anxiety, cheating and low self-esteem (Fritzsche, Young & Hickson, 2003). It was suggested that people might procrastinate because of their lack of control for prompt, fun tasks at the expense of prescribed tasks (Ferrari and Emmons, 1995) and Steel (2007) argued that procrastination is referred to as a typical self-control problem.

Research by Solomon and Rothblum (1984) suggests that aversiveness is one of the reasons for procrastination. Task aversiveness is defined in terms of how unpleasant or unenjoyable it is to perform a task (Blunt & Pychyl, 2000). The more tasks are perceived as unpleasant or unenjoyable, the more people procrastinate. Different types of task aversiveness have been explored, among other things task aversiveness towards academic tasks (Steel, 2007). Studies found that college students procrastinated more on tasks that were perceived as unpleasant, boring or difficult (Ferrari, Keane, Wolfe & Beck, 1998; Krause & Freund, 2016). Gillebaart and Kroese (2016) argued that people with high trait self-control feel less aversion towards study behavior. Summarizing, procrastination is considered a typical self-control problem and task aversiveness is an important motive for this procrastination in behavior such as studying.

Several investigators focused on trait self-control and task aversiveness (Tangney et al., 2004; Kuhl & Beckmann, 1994), but few focused on task aversiveness as a mediator in the relation between trait self-control and self-control related behavior. Gillebaart and Kroese (2016) imply a novel direction in research into how people with high trait self-control successfully perform goal-directed behavior. They conducted research focusing on this mediating role of task aversiveness in the relation to trait self-control and multiple behaviors often linked to self-control. Gillebaart and Kroese expected and found that task aversiveness mediates the relationship between trait self-control and behavior. They stated that a higher level of trait self-control leads to lower task aversiveness, which consecutively increased habit strength and frequency of the behaviors. Focusing on study behavior specifically, trait self-

control predicted more hours of study through decreased task aversiveness. Gillebaart and Kroese conclude that people with high trait self-control feel less aversive towards study behavior rather than simply being better at inhibiting impulses.

In the current study, we will further investigate to what extent task aversiveness influences the relationship between trait self-control and study behavior by changing two aspects of the studies by Gillebaart and Kroese. They conducted a cross-sectional study and thus investigated the participants at one specific moment in time, using self-reports of current self-control and task aversiveness and past behavior. In two studies, people were asked to report their task aversiveness by answering multiple questions about this aversiveness. In the current study this task aversiveness will be manipulated rather than measuring it. An advantage of a manipulation instead of measuring aversiveness is that one can establish more firmly that the behavior that follows is actually influenced by the manipulation of aversiveness, whereas in Gillebaart and Kroese's set-up, this cannot be established with certainty. Continuing, in order to further establish the proposed mediation model, current research will use a short-term longitudinal research design. By measuring at two different moments, the specific behavior will take place after the manipulation. Thereby the possibility of an alternative direction regarding this relationship will be excluded. Other advantages of this manipulation are that it provides better control of the experiment and enhances the internal validity. Subsequently, this will lead to stronger conclusions regarding the relation between trait self-control, study behavior and task aversiveness.

In this paper the relationship between trait self-control and study behavior will be investigated, since study behavior generally includes activities that require self-control (Hofmann, Vohs & Baumeister, 2012). Previous research found that having high trait self-control foresees better study behavior (Galla & Duckworth, 2015; Tangney et al., 2014). Based on this research, it is hypothesized that a higher level of trait self-control predicts better study behavior. Furthermore, research found that task aversiveness plays a mediating role in the relation between self-control and study behavior; self-control predicted more hours of study through decreased task aversiveness (Gillebaart & Kroese, 2016). Therefore, it is hypothesized that task aversiveness moderates the relation between trait self-control and study behavior. We propose that task aversiveness is an aspect that diminishes study behavior, but chiefly for people with low trait self-control. It is predicted that people with lower levels of trait self-control will have lower study behavior when task aversiveness is high, contrasting to when task aversiveness is low. Furthermore, it is expected that task aversiveness does not influence study behavior for people with high trait self-control. By investigating task

aversiveness, the expected results will contribute to the findings of Gillebaart and Kroese (2016) and to a novel line of research. If task aversiveness has a moderating role in this relationship, people can be aided with their study behavior and achieving their long-term goals by focusing on task aversiveness. Furthermore, the current study focuses more on trait self-control success rather than trait self-control failure, which till now remains mostly unexplored.

3. Method

Participants. A total of 232 participants took part in part one of this study. 32 participants did not complete the second part of the study and were excluded from the dataset. Due to missing data in the self-control and/or task aversiveness questionnaires, another 13 participants were excluded from the analyses. Eventually, a final sample of 187 participants was included in the analysis. The participants had a mean age of $M = 24.42$ ($SD = 5.49$) and consisted of 104 females and 83 males. A total of 175 participants were recruited via an online platform named Prolific (https://www.prolific.ac/). Four eligibility requirements were outlined for the present study: people needed to be (i) a student, (ii) their nationality had to be American or English, (iii) their current education level needed to be undergraduate degree or graduate degree and (iv) their native language should be English. These requirements were in place to ensure participants could genuinely answer questions related to their study behavior and in order that they would be able to precisely interpret these questions in English. Participants received a reward of $0.85 per completed part. The remaining 57 participants were recruited in the social network of the researcher. These participants also needed to be students and since they were students at the university or college, it was assumed they had a substantial level of English language and therefore were able to genuinely interpret the English questions. They did not receive a monetary reward. All participants were invited to answer questions about personality and study behavior.

Design.

In this study the relationship between the independent variables *self-control and task aversiveness*, and the dependent variable *study behavior* was investigated. Both between-subjects variables *self-control* and *study behavior* were measured on a continuous scale. The interaction between *self-control* and *task aversiveness* was examined, to generate a deeper and more refined understanding of the relationship between *self-control* and *study behavior*. Participants were randomly assigned to one of two task aversiveness conditions and only participants in the experimental condition (low task aversiveness condition) received the task aversiveness manipulation. A mixed-research design was used to investigate differences

between participants and differences in time and a short-term longitudinal design was set up, containing two measure moments, a manipulation and two surveys. A week after the first measure moment and survey one, participants received the second part of the study.

Materials. Demographic information was obtained at the start of the survey. Participants answered questions about their age, gender and study.

Self-control was assessed in part one of the study, using the Brief Self-Control scale (Tangney et al., 2004). The scale consisted of 13 items (e.g. 'I have trouble concentrating.' and 'I refuse things that are bad for me.'). Items were rated on a 5-point Likert scale (1 = not at all like me, 5 = very much like me) and the total score represented the self-control level. To perform the analysis, the following items should be reversed: 2, 3, 4, 5, 7, 9, 10, 12, 13. The scale proved highly reliable with a Cronbach's α of .85.

Study behavior was assessed with the Student Study Behavior Inventory (SSBI) in the second part of the study. This is an adjusted version of the Study Behavior Inventory (SBI) (Bliss & Mueller, 1993) which was compiled by the Antelope Valley College (Antelope Valley College, 2017). It is a 20-item instrument and subjects responded on a 5-point Likert scale (1 = never, 5 = always) to what extent statements applied to them (see appendix 1). The scale proved highly reliable with a Cronbach's α of .89.

Furthermore, in the first survey participants were asked to report how many hours they spend on their study (0-10, 10-20, 20-30, 30-40, or more than 40 hours per week) and if they find it difficult to meet deadlines (1 = extremely difficult, 2 = somewhat difficult, 3 = neither easy nor difficult, 4 = somewhat easy, 5 = extremely easy).

For *task aversiveness* two conditions were created: a low task aversiveness condition and a control condition. In the first part of the study, participants in the low task aversiveness condition were asked to think about a successfully completed deadline. They were instructed to write ten sentences about pleasurable aspects of this deadline and the positive emotions they felt regarding to this. The control condition did not receive a question about a successful deadline and the writing assignment.

To evaluate if changes between participants occur through the manipulation rather than through other factors, a manipulation check was conducted. This was done by adding three items at both the start (task aversiveness scale T1) and end of survey one (task aversiveness scale T2), and at the end of survey two (task aversiveness scale T3): 'Studying is something I find pleasurable' (reverse coded), 'If I'm honest, studying is something I'd rather not do' and 'I enjoy studying' (reverse coded) (Gillebaart & Kroese, 2016). The internal consistency of the scales was high. Task aversiveness scale T1 proved reliable with a

Cronbach's α of .92. Task aversiveness scale T2 had a Cronbach's α of .94 for the low task aversiveness condition and task aversiveness scale T2 for the control condition proved reliable with a Cronbach's α of .91. Task aversiveness scale T3, at the end of survey two, proved reliable with a Cronbach's α of .91.

Procedure. Participants were invited to join the online survey. At the start of this survey an informed consent, task aversiveness scale T1 and demographic information was obtained. Afterwards, two questions regarding study behavior were asked. After filling out the Brief Self-control Scale, participants in the low task aversiveness condition were asked to write ten sentences about a successful completed deadline. At the end of survey one task aversiveness was assessed again with task aversiveness scale T2. A week later, the participants filled out the second survey, starting with an informed consent. Then, the SSBI was presented to the participants. Afterwards, with task aversiveness scale T3, task aversiveness was assessed one last time. Finally, the participants were debriefed.

4. Results

Descriptive statistics

Participants answered the question about the amount of hours they spend on their study with a mean of $M = 2.47$ ($SD = 1.08$) (on a 5-point Likert scale), indicating that participants spent 10-20 hours per week on studying. The question about the difficulty of meeting a deadline was answered with a mean of $M = 3.05$ ($SD = .97$) (on a 5-point Likert scale), indicating that participants found it 'neither easy nor difficult' to meet a deadline. Results show that the level of trait self-control was significantly positively related to hours spent on study ($r(186) = .26$, $p = <.01$) and significant positively correlated to how difficult participants find it to meet deadlines ($r(186) = .39$, $p = <.01$). This indicates that the higher the level of trait self-control, the more hours the participants spend on their study and the more difficult they find it to meet a deadline. Self-control was not significant related to age and gender.

Test scores

Participants had a mean self-control score of $M = 3.16$ ($SD = .64$) and a mean score on study behavior of $M = 3.04$ ($SD = .67$). The mean scores and standard deviations on task aversiveness are represented in Table 1. Unexpectedly, on task aversiveness T1, T2 and T3, results show an overall trend of higher mean scores for the low task aversiveness condition compared to the control condition.

Table 1 *Mean scores (M) and standard deviations (SD) of task aversiveness T1, T2 and T3*

	M	SD
Task aversiveness T1 low task aversiveness condition	3.53	1.46
Task aversiveness T1 control condition	3.36	1.39
Task aversiveness T2 low task aversiveness condition	3.53	1.48
Task aversiveness T2 control condition	3.42	1.43
Task aversiveness T3 low task aversiveness condition	4.04	1.45
Task aversiveness T3 control condition	3.60	1.49

Manipulation check

To check effectiveness of the task aversiveness manipulation, three independent sample t-tests were conducted. For task aversiveness scale T1, as expected, there was no significant difference between the low task aversiveness condition and the control condition, $t(185) = -.83$, $p = .407$. Unexpectedly, for task aversiveness scale T2 there was no significant difference between the low task aversiveness condition and the control condition, $t(185) = -.51$, $p = .615$. As expected, for task aversiveness scale T3, a significant difference between the low task aversiveness condition and the control condition was found, $t(185) = -2.01$, $p = .046$. It was expected to find a higher mean score for the control condition. Contradictory to the expectations, the low task aversiveness condition had a higher mean score on task aversiveness compared to the control condition.

Key variables

To investigate whether trait self-control predicted study behavior, a regression analysis was conducted. It was expected that a higher level of trait self-control predicted better study behavior. In line with the hypothesis, self-control level was significantly positively related to study behavior assessed with the SSBI, ($b = .475$, $t(186) = 7.34$, $p = <.001$), which indicated that the higher the trait self-control level, the better the study behavior.

The correlations between key variables were analyzed. Study behavior was significantly negatively related to task aversiveness T1 ($r(186) = -.33$, $p = <.01$). Additionally, significant negative correlations between study behavior and task aversiveness T2 ($r(186) = -.34$, $p = <.01$) and task aversiveness T3 ($r(186) = -.34$, $p = <.01$) were found. This indicated that for task aversiveness T1, T2 and T3 the lower the task aversiveness, the better the study behavior.

Furthermore, a mediation analysis was conducted to investigate whether task aversiveness scale T1 mediates the relation between trait self-control and study behavior. Trait self-control was investigated as independent variable, study behavior as dependent variable and task aversiveness as mediator. Results show that trait self-control significantly negatively predicted task aversiveness T1, $b = -.85$, $t = -5.58$, $p = <.001$, indicating that the higher the level of self-control, the lower the task aversiveness. There was a significant indirect effect of trait self-control on study behavior through task aversiveness T1, $b = .07$, CI 95% [.019, .132]. This replicated findings by Gillebaart and Kroese (2016), they found that higher trait self-control predicted a lower level of task aversiveness, which in turn increased the habit strength and frequency of study behavior.

Main analyses

The main aim of this research was to investigate the moderating role of task aversiveness on the relation between self-control and study behavior. An interaction effect between self-control and task aversiveness on study behavior was predicted. Furthermore, it was expected that task aversiveness diminishes study behavior, but chiefly for people with low trait self-control. To explore the hypotheses, moderation analyses were conducted using the SPSS PROCESS macro by Hayes (2016), with trait self-control as moderator, task aversiveness as independent variable and study behavior as dependent variable. Task aversiveness scale T1 was considered a randomization check and as aforementioned, no significant difference was found between the two conditions. Therefore, task aversiveness scale T1 was not included in the moderator analyses. Since the conditions did not significantly differ on task aversiveness T2 but did significantly differ on task aversiveness T3, both task aversiveness scales T2 and T3 were included in the moderation analyses as independent variables. To investigate whether the level of trait self-control predicted task aversiveness T2 and T3, two regression analyses were conducted. The analyses show that self-control level did significantly negatively predicted task aversiveness at task aversiveness scale T2 ($b = -.38$, $t(186) = -5.58$, $p = <.001$) and task aversiveness scale T3 ($b = -.42$, $t(186) = -6.20$, $p = <.001$). This indicated that the higher the level of self-control, the lower the task aversiveness. This is in line with previous findings by Gillebaart and Kroese (2016).

To test the hypotheses, trait self-control was investigated as a moderator. For task aversiveness scale T2, a significant positive main effect for self-control ($b = .43$, 95% CI [.282, .577], $t = 5.74$, $p = <.001$) and a significant negative main effect for task aversiveness T2 ($b = -.08$, 95% CI [-.151, -.017], $t = -2.46$, $p = .01$) was found on study behavior. For task aversiveness scale T3, a significant positive main effect for self-control ($b = .43$, 95% CI

[.280, .572], $t = 5.77$, $p = <.001$) and a significant negative main effect for task aversiveness T3 ($b = -.08$, 95% CI [-.138, -.017], $t = -2.52$, $p = .01$) was found on study behavior. For both task aversiveness scale T2 and task aversiveness scale T3, a non-significant interaction effect between self-control and task aversiveness on study behavior was found, $b = .03$, 95% CI [-.051, .105], $t = .69$, $p = .49$, $b = .01$, 95% CI [-.063, .089], $t = .33$, $p = .74$ respectively. Table 2 represents the simple slopes analyses to interpret the moderation effect. For both task aversiveness T2 and task aversiveness T3, results show that for people with low trait self-control a significant negative relationship between task aversiveness and study behavior was found. People with low trait self-control have, when task aversiveness is low, better study behavior contrasting to when task aversiveness is high. This significant relationship is not found for people with high trait self-control on task aversiveness T2 and T3, indicating that the level of task aversiveness does not influence study behavior for people with high trait self-control.

Table 2 *Simple slopes analyses for self-control as moderator of the relation between task aversiveness T2 and T3 and study behavior*

	b	95% CI	t	p
Task aversiveness T2				
Low self-control (-1 SD)	-.10	[-.179, -.024]	-2.60	.01
Mean value of self-control	-.08	[-.151, -.017]	-2.46	.01
High self-control (+1 SD)	-.07	[-.157, .023]	-1.47	.14
Task aversiveness T3				
Low self-control (-1 SD)	-.09	[-.160, -.010]	-2.24	.03
Mean value of self-control	-.08	[-.138, -.017]	-2.52	.01
High self-control (+1 SD)	-.07	[-.148, .010]	-1.72	.09

5. Discussion

In the current study we investigated the relationship between trait self-control and study behavior, with the main focus on the moderating role of task aversiveness. This study contributed to limited research into the underlying processes of self-control success.

The relation between key variables trait self-control and study behavior was investigated. It was expected to find a significant positive relation between self-control and study behavior and indeed, findings demonstrate that a higher level of trait self-control

predicts better study behavior. Therefore, having high trait self-control is beneficial for peoples' study behavior, which was in line with previous research (Gillebaart & Kroese, 2016; Galla & Duckworth, 2015; De Ridder et al., 2012).

As results show, having high trait self-control is related to the amount of hours participants spent on their study. The higher the level of trait self-control, the more hours participants spend on their study. The level of trait self-control was also related to how difficult participants find it to meet deadlines. The higher the level of trait self-control, the more difficult they find it to meet the deadlines. This finding seems a bit counter-intuitive, but Tangney and colleagues (2004) stated that self-control is positively associated with self-oriented perfectionism. Self-oriented perfectionism is defined as "requiring perfection for oneself" (Sherry, Hewitt, Besser, McGee & Flett, 2004, p. 70). An explanation for this positive relation between level of trait self-control and experienced difficulty to meet deadlines could be that since people high in trait self-control require themselves to be excellent, they possibly find it more difficult to meet deadlines contrasting to people low in trait self-control as they set higher personal standards.

On task aversiveness scales T1, T2 and T3, significant negative relationships were found between self-control and task aversiveness. This indicates that the higher the level of trait self-control, the lower the task aversiveness. These findings align with previous research by Gillebaart and Kroese (2016). Additionally, significant negative relationships between the three task aversiveness scales and study behavior were found, which suggests that the lower the task aversiveness, the better the study behavior. This is in line with previous research by Ferrari and colleagues (1998), Krause and Freund (2016) and Tangney and colleagues (2004). Furthermore, a significant indirect effect of trait self-control on study behavior through task aversiveness was found, which replicated findings by Gillebaart and Kroese (2016).

The present study attempts to gain deeper insight into the moderating role of task aversiveness in the relation between trait self-control and study behavior. A moderation effect between task aversiveness and trait self-control on study behavior was predicted. However, non-significant interaction effects between trait self-control and task aversiveness on study behavior were found. These findings were contradictory to the hypothesis and came as a surprise since task aversiveness was significantly correlated with trait self-control and study behavior. As mentioned before, procrastination was associated with low trait self-control (Kroese & De Ridder, 2015) and Steel (2007) argued that people, who concede to immediate temptations and have difficulty with inhibiting their impulses (e.g. people with low trait self-control), procrastinate more. Task aversiveness was one of the reasons for people to

procrastinate (Solomon & Rothblum, 1984). Students tend to procrastinate more on tasks that they recognized as unpleasant, boring or difficult. Previous research found that besides task aversiveness, fear of failure and self-efficacy were central predictors to procrastination (Krause & Freund, 2014; Wolters, 2003). Solomun and Rothblum (1984) found that 49.4% of the variance in procrastination relates to fear of failure and 18% of the variance in procrastination relates to task aversiveness. Continuing, procrastination was associated with study behavior (Tangney et al., 2004) and research showed that aversiveness of the task is seldom the only reasoning for students to procrastinate (Solomon & Rothblum, 1984). Additionally, when students were asked why they procrastinate, they answered in terms of task aversiveness and fear of failure. Since the focus of this research was only on task aversiveness, there is a possibility that this did not generate the expected results. For future research it is interesting to investigate if fear of failure and/or self-efficacy moderates the relation between trait self-control and study behavior, as procrastination is linked to low trait self-control and study behavior. When investigating these factors, knowledge will be gained on what exactly influences the relation between trait self-control and study behavior and which underlying processes contribute to self-control success.

It was expected that task aversiveness diminishes study behavior, but mainly for people with low trait self-control. This study investigated whether people with lower levels of trait self-control will have worse study behavior when task aversiveness is high, contrasting to when task aversiveness is low. Indeed, results show that when self-control is low, there is a significant negative relationship between task aversiveness and study behavior. This indicates that when self-control is low and task aversiveness is high, study behavior will be worse, contrasting to when self-control is low and task aversiveness is low, as study behavior will be better. This is in line with the hypothesis. As expected, results show that when self-control is high, non-significant relationships between task aversiveness and study behavior were found, indicating that task aversiveness does not influence study behavior for people with high trait self-control.

Strengths, limitations and future research

As mentioned before, this study contributed to the limited research into the underlying processes of trait self-control success. Having high trait self-control is relevant to most behaviors for a successful life (Tangney et al., 2004). However, there is still no reasonable explanation for why people high in trait self-control are so successful in performing self-control related behavior. Therefore, it is advantageous to gain insight in the few investigated underlying processes of self-control success. This study is an addition to two studies by

Gillebaart and Kroese (2016) and differentiates itself by using a manipulation rather than only a task aversiveness measurement and by using a short-term longitudinal design to establish more firm conclusions regarding the causality of the relations between trait self-control, task aversiveness and study behavior.

There are some limitations to this research. Two manipulation checks were conducted to check whether the two conditions differ in terms of task aversiveness. After the manipulation, task aversiveness scale T2 was presented to the participants. It was expected that a significant difference between the experimental and control condition would be found. However, this significant difference was not established. Contradictory to the expectations, the low task aversiveness condition had a higher non-significant mean score on task aversiveness compared to the control condition. On task aversiveness scale T3, the low task aversiveness condition and control condition did significantly differ. This indicates that the level of task aversiveness of participants in the low task aversiveness condition was significantly different compared to the level of task aversiveness of participants in the control condition. Unexpectedly, participants in the low task aversiveness condition had a significant higher mean score on task aversiveness than participants in the control condition. Instead of generating an immediate difference between the two conditions directly after the manipulation, it took longer for the manipulation to work. Because of the longitudinal design, there was an advantageous possibility to investigate the delayed effect of the experiment. Furthermore, the results were obtained in a natural setting. Although there is no tight control over the setting that is associated with laboratory research, the investigated behaviors are enclosed in naturally occurring situations. A suggestion for future research might be to measure task aversiveness on multiple time moments and to use a mixed research design to investigate differences between participants and differences in time. This is advantageous for investigating the possible delayed effect of the manipulation.

The low task aversiveness condition was set up to decrease the level of task aversiveness. Surprisingly, observation of the descriptive statistics in Table 1 shows an overall trend of higher mean scores for the low task aversiveness condition compared to the control condition. For task aversiveness scales T1 and T2, this difference was not significant, but on task aversiveness scale T3 the groups did significantly differ. Although the manipulation tended to reduce the task aversiveness, it may be that this evoked a contradictory effect. This is also known as the *boomerang effect*, first investigated by Wegner, Schneider, Carter and White (1978). A popular, commonly used example is the one with the white bear: suppressing thoughts about white bears causes it to come back more often and

prominently into the mind. It might be that, even though people were asked to think about a successfully completed deadline rather than a not (successfully) completed deadline, thinking about this increased the overall task aversiveness instead of decreasing it. There is a possibility that because people are focusing on deadlines, they might think about future deadlines and tasks they still need to do and that this evoked a higher task aversion. Furthermore, it could be that it was too difficult to come up with ten sentences filled with positive aspects of the successfully completed deadline and that this further increased the task aversiveness. Ten sentences filled with positive aspects of a successful completed deadline is a lot and there is a possibility that people were struggling with writing ten full sentences. It might be that three sentences were enough to decrease the task aversiveness, while ten sentences increased it. Future research could, for example, focus on a smaller amount of sentences for the low task aversiveness condition and add a high task aversiveness condition that uses the ten-sentence manipulation. This latter manipulation could focus on not (successfully) completed deadlines instead of successful completed deadlines. It is interesting to investigate if results differ when multiple manipulations and various conditions as a low task aversiveness condition, high task aversiveness condition and control condition are used.

Another limitation of current study is that a homogenous sample was used. Only students of the university or college did participate in this study and they had an overall medium to high score on trait self-control. Research by Meldrum, Petkovsek, Boutwell and Young (2017) shows that intelligence is associated with better self control. However, the majority of the Dutch population has a low or secondary education, compared to a minority of Dutch people who have a higher education. Therefore, it is difficult to generalize the results to the overall population. To have more generalizable results, it would be interesting for future research to have a sample of participants with lower trait self-control and more disparate scores on the self-control scale. Additionally, this sample should include not only students of the university or college, but also students who study in secondary vocational education.

Furthermore, study behavior was investigated with the SSBI and this scale has proved to be highly reliable. To increase the validity, future research could investigate study behavior with a combination of multiple scales. Additionally, the current research only used self-reports of current self-control and study behavior and as an addition, observations and/or more behavioral measurements, as "how many hours did you spend on your study" could be included in future research.

At last, in the current study the main focus was on study behavior. Future research could focus on other self-control related behavior to investigate whether current findings could be generalized to other behavior for which self-control is needed.

Conclusion

Even though a high level of trait self-control is beneficial for a successful life, a lot of research has focused on self-control failure, while self-control success remains unexplored (Gillebaart et al., 2015). Having high trait self-control is beneficial in multiple areas and especially for academic performance (De Ridder et al., 2012). Previous research found that high trait self-control predicts better study behavior (Galla & Duckworth, 2015; Tangney et al., 2004; Wolfe & Johnson, 1995) and similar results were found in the current study: people with higher levels of trait self-control have better study behavior. Contradictory to the hypothesis, task aversiveness does not moderate the relation between trait self-control and study behavior. However, people with lower levels of self-control have worse study behavior when task aversiveness is high, contrasting to when task aversiveness is low. For people with high trait self-control, task aversiveness does not influence study behavior. These findings align with research by Gillebaart and Kroese (2016) and the results contribute to knowledge of the underlying mechanisms of self-control success.

6. Reference list

Adriaanse, M. A., Kroese, F. M., Gillebaart, M., & De Ridder, D. T. (2014). Effortless inhibition: Habit mediates the relation between self-control and unhealthy snack consumption. *Frontiers in Psychology*, *5*. doi:10.3389/fpsyg.2014.00444

Antelope Valley College (2017). *Student Study Behavior Inventory*. Retrieved from: https://www.avc.edu/studentservices/lc/tools

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current directions in psychological science*, *16*, 351-355.

Bliss, L. B., & Mueller, R. J. (1993). An instrument for the assessment of study behaviors of college students. *Literacy Research and Instruction*, *32*, 46-52.

Blunt, A. K., & Pychyl, T. A. (2000). Task aversiveness and procrastination: A multi-dimensional approach to task aversiveness across stages of personal projects. *Personality and Individual Differences*, *28*, 153-167. doi:10.1016/S0191-8869(99)00091-4

De Ridder, D. T., Lensvelt-Mulders, G., Finkenauer, C., Stok, F. M., & Baumeister, R. F. (2012). Taking stock of self-control a meta-analysis of how trait self-control relates to a wide range of behaviors. *Personality and Social Psychology Review*, *16*, 76-99. doi:10.1177/1088868311418749

Duckworth, A., & Gross, J. J. (2014). Self-control and grit: Related but separable determinants of success. *Current Directions in Psychological Science*, *23*, 319-325.

Duckworth, A. L., & Seligman, M. E. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science*, *16*, 939-944. doi:10.1111/j.1467-9280.2005.01641.x

Ferrari, J. R., & Emmons, R. A. (1995). Methods of procrastination and their relation to self-control and self-reinforcement: An exploratory study. *Journal of Social Behavior and Personality*, *10*, 135.

Ferrari, J. R., Keane, S. M., Wolfe, R. N., & Beck, B. L. (1998). The antecedents and consequences of academic excuse-making: Examining individual differences in procrastination. *Research in Higher Education*, *39*, 199-215.

Fritzsche, B. A., Young, B. R., & Hickson, K. C. (2003). Individual differences in academic procrastination tendency and writing success. *Personality and Individual Differences*, *35*, 1549-1557.

Fujita, K. (2011). On conceptualizing self-control as more than the effortful inhibition of impulses. *Personality and Social Psychology Review*, *15*, 352-366.

Galla, B. M., & Duckworth, A. L. (2015). More than resisting temptation: Beneficial habits mediate the relationship between self-control and positive life outcomes. *Journal of Personality and Social Psychology*, *109*, 508-525. doi:10.1037/pspp0000026

Gillebaart, M. & Kroese, F.M. (2016). *'But I don't want to': The role of task aversiveness in self-control's effects on behavior.* Manuscript in preparation.

Gillebaart, M., Schneider, I. K., & De Ridder, D. T. (2015). Effects of trait self-control on response conflict about healthy and unhealthy food. *Journal of Personality*. doi: 0.1111/jopy.12219

Hagger, M. S., Wood, C., Stiff, C., & Chatzisarantis, N. L. (2010). Ego depletion and the strength model of self-control: a meta-analysis. *Psychological bulletin*, *136*, 495-525.

Hofmann, W., Luhmann, M., Fisher, R. R., Vohs, K. D., & Baumeister, R. F. (2014). Yes, but are they happy? Effects of trait self-control on affective well-being and life satisfaction. *Journal of Personality*, *82*, 265-277.

Hofmann, W., Vohs, K. D., & Baumeister, R. F. (2012). What people desire, feel conflicted about, and try to resist in everyday life. *Psychological Science*, *23*(6), 582-588.

Inzlicht, M., & Schmeichel, B. J. (2012). What is ego depletion? Toward a mechanistic revision of the resource model of self-control. *Perspectives on Psychological Science*, *7*, 450-463.

Krause, K., & Freund, A. M. (2014). How to beat procrastination. *European Psychologist*.

Kroese, F. M., & De Ridder, D. T. (2015). Health behaviour procrastination: a novel reasoned route towards self-regulatory failure. *Health Psychology Review*, *10,* 313-325. doi:10.1080/17437199.2015.1116019

Kuhl, J., & Beckmann, J. (1994). Alienation: Ignoring one's preferences. *Volition and personality: Action versus state orientation,* 375-390.

Kuijer, R., De Ridder, D., Ouwehand, C., Houx, B., & van den Bos, R. (2008). Dieting as a case of behavioural decision making. Does self-control matter?. *Appetite*, *51*, 506-511.

Meldrum, R. C., Petkovsek, M. A., Boutwell, B. B., & Young, J. T. (2017). Reassessing the relationship between general intelligence and self-control in childhood. *Intelligence*, *60*, 1-9.

Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: dynamics of willpower. *Psychological review*, *106*, 3-19.

Mischel, W., & Ayduk, O. (2004). Willpower in a cognitive-affective processing

system. *Handbook of self-regulation: Research, theory, and applications*, 99-129.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle?. *Psychological bulletin*, *126*, 247-259.

Onwuegbuzie, A. J., & Collins, K. M. (2001). Writing apprehension and academic procrastination among graduate students. *Perceptual and motor skills*, *92*, 560-562.

Sherry, S. B., Hewitt, P. L., Besser, A., McGee, B. J., & Flett, G. L. (2004, p.70). Self-oriented and socially prescribed perfectionism in the Eating Disorder Inventory Perfectionism subscale. *International Journal of Eating Disorders*, *35*, 69-79.

Solomon, L. J., & Rothblum, E. D. (1984). Academic procrastination: Frequency and cognitive-behavioral correlates. *Journal of counseling psychology*, *31*, 503-509.

Steel, P. (2007). The nature of procrastination: a meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, *133*, 65-94. doi:10.1037/0033-2909.133.1.65

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self- control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, *72*, 271-324. doi:10.1111/j.0022-3506.2004.00263.x

Wegner, D. M., Schneider, D. J., Carter, S. R., & White, T. L. (1987). Paradoxical effects of thought suppression. *Journal of personality and social psychology*, *53*, 5.

Wolfe, R. N., & Johnson, S. D. (1995). Personality as a predictor of college performance. *Educational and psychological measurement*, *55*, 177-185.

Wolters, C. A. (2003). Understanding procrastination from a self-regulated learning perspective. *Journal of Educational Psychology*, *95*, 179.

7. Appendix 1: Student Study Behavior Inventory

1. In the last 7 days, I regularly prioritized study tasks.
2. In the last 7 days, I completed my study task, even when I did not want to.
3. In the last 7 days, I selected a time and a place for studying that was the most efficient and effective.
4. In the last 7 days, I used a time management system effectively.
5. In the last 7 days, I turned my work in on time.
6. In the last 7 days, I understood what I read in my textbook.
7. In the last 7 days, I took complete and clear notes.
8. In the last 7 days, I recognized when my instructor said something especially important.
9. In the last 7 days, I prepared for class by previewing the chapter that was going to be discussed.
10. In the last 7 days, I talked to my instructor, tutor, or classmates when I did not understand something.
11. In the last 7 days, I had a regular study time every day.
12. In the last 7 days, I spaced my study time rather than cramming.
13. In the last 7 days, I tried to make sense of what I am studying rather than just memorizing.
14. In the last 7 days, I reviewed notes regularly instead of just before an exam.
15. In the last 7 days, I tried to relate what I am studying to the big picture.
16. In the last 7 days, I was able to guess what might be on an exam.
17. In the last 7 days, I made up practice questions before the exam.
18. In the last 7 days, I was familiar with test taking strategies.
19. In the last 7 days, I did not have test anxiety.
20. In the last 7 days, I analyzed my errors on exams to improve my test performance.

Answers on a 5-point Likert scale

1 = never

2 = sometimes

3 = about half the time

4 = most of the time

5 = always