

# 40 Self-Control Interventions

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## Practical Summary

Pursuing long-term goals such as studying for an exam, saving enough money for a deposit to buy a house, and maintaining a harmonious interpersonal relationship requires persistence on important behaviors that lead to goal progress and avoidance of the myriad distractions and other available courses of action, particularly those that are more immediately appealing and rewarding. Such endeavors require “good” self-control. Individuals with good self-control demonstrate persistence on tasks toward a particular goal and are adept at avoiding temptations that may derail those efforts. Such individuals usually develop good habits for desirable behaviors and strategically avoid situations where they might be tempted. Although research suggests that good self-control is relatively stable, there is evidence that self-control ability can be improved through training. A typical approach to training self-control involves individuals regularly engaging in tasks that require them to inhibit their innate desires and “dominant” responses. These tasks can be computerized tasks that require inhibition of a well-learned response or even everyday tasks with a similar requirement (e.g., using the nondominant hand or avoiding colloquial speech). Over time, such tasks have been shown to improve self-control for other behaviors. Despite the promising early findings of self-control training studies in improving behavioral outcomes, more studies are needed to examine the persistent effects of self-control training on meaningful, adaptive outcomes in the long term and in “real-world” contexts.

## 40.1 Introduction

In many areas of life, people encounter self-control dilemmas on a daily basis, if not multiple times a day. In the health domain, people may experience a conflict between an active lifestyle and the short-term gratification of curling up on the couch or between an appropriate bedtime and a series cliffhanger that tempts them to stay up. When it concerns financial matters, people have to balance long-term benefits of saving up for pensions or buying a home while being

bombarded with marketing strategies and opportunities for short-term gratifying consumer behavior. Relating to interpersonal affairs, controlling one’s behavior when interacting with loved ones can be challenging after a taxing work day or when fatigue sets in. These examples illustrate the potential of self-control as a means to prioritize long-term goals (such as staying fit) over

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gratification of immediate concerns (such as watching television all night).

Many studies have demonstrated that self-control is an important contributing factor in determining behavior and outcomes in multiple life domains. For example, high self-control is associated with better health and well-being, adjustment, and satisfying social relationships, whereas low self-control is associated with poor health, addiction, financial debt, poor academic achievement, and lower job performance (De Ridder et al., 2012; Moffitt et al., 2011; Tangney, Baumeister, & Boone, 2004). Not only are people with high self-control more successful in various ways; they are also happier. For example, research has demonstrated that individuals with high self-control report greater happiness and psychological well-being (Cheung et al., 2014; Hofmann et al., 2014). From this broad evidence base, it follows that interventions that are effective in promoting high self-control have the potential to promote behaviors that will lead to better well-being and adaptive outcomes. However, despite accumulating insights into the impact of self-control on people's lives, the development of interventions that improve self-control is still in a relatively early stage. Consistent, high-quality evidence for the implementation and long-term effectiveness of interventions to improve self-control is lacking.

This chapter focuses on the current body of knowledge that has informed self-control interventions and provides an overview of the state of the research on the interventions as well as suggestions for future research that is required to gain a more comprehensive knowledge of self-control interventions for behavior change in a variety of contexts and populations.

## 40.2 Definitions

In order to discuss self-control interventions, it is first important to define two core concepts: self-control and self-control training. *Self-control* can be defined as the process of giving precedence to distal, long-term motives over proximal, short-

term motives when these motives conflict. Prioritization may occur by resisting the proximal, short-term motives (such as temptations, impulses, desires) or by using self-control strategies that give way to long-term goals (De Ridder et al., 2012; Fujita, 2011; Gillebaart & De Ridder, 2015; Hofmann, Friese, & Strack, 2009; see also Chapter 11, this volume).

It is important to distinguish *trait* from *state* self-control: Trait self-control is the dispositional propensity to exert self-control that differs between individuals and is relatively stable within individuals over time (Tangney et al., 2004). State self-control refers to the capacity for self-control that differs within individuals across contexts and situations. Existing self-control interventions primarily address state self-control but new interventions aimed at trait self-control are emerging (De Ridder et al., 2019). *Self-control training* refers to a variety of interventions aimed at enhancing the probability that individuals prioritize their long-term motives over their short-term ones when they are in conflict (Berkman, 2018).

## 40.3 Theory and Mechanisms of Change

Traditionally, trait self-control research has focused on effortful inhibition as the core (and sometimes sole) component of self-control (e.g., Baumeister, 2014; Tangney et al., 2004). Recent theory and research has expanded this approach and proposed that people with higher trait self-control may also benefit from directly prioritizing their long-term goals, which may be achieved by strategies that take less effort than inhibiting impulses (De Ridder et al., 2012; Duckworth, Matthews, & Kelly, 2007; Fujita, 2011; Gillebaart & De Ridder, 2015; Trope & Fishbach, 2000). Specifically, a meta-analysis on trait self-control showed robust associations with outcomes that were stronger for behaviors that were rated as “automatic” as compared to behaviors that were rated as “controlled” (De Ridder et al., 2012). Recent research corroborated these findings

by demonstrating that habits (i.e., behaviors that may occur with little effort or conscious intention; see Chapter 13, this volume) consistently mediate the association between trait self-control and behavior in the areas of eating, exercising, and study behavior (Adriaanse et al., 2014; Galla & Duckworth, 2015; Gillebaart & Adriaanse, 2017). One implication of these findings is that automatization of goal-conducive behavior may become less effortful over time. Another implication is that prioritization of long-term motives does not need to happen in the heat of the moment of a self-control conflict but may also happen long before and in fact help individuals experience fewer conflicts in the first place (Hofmann, Baumeister et al., 2012).

Besides the automatization of self-control as a way of successfully prioritizing long-term motives over short-term ones, scholars have also started to examine “strategic self-control,” that is, the employment of self-control skills as a function of situational requirements (Ayduk et al., 2000; Gillebaart & De Ridder, 2015; Fujita, 2011; Friese, Hofmann, & Wiers, 2011). For example, a set of studies on academic study behavior showed that students with a higher level of trait self-control more often used an avoidant strategy by opting for a room without distractions to study in instead of a room with more opportunity to socialize (Ent, Baumeister, & Tice, 2015). In addition, it has been proposed that people may rely on a set of strategies that could either be more “antecedent” to the self-control dilemma (and may potentially avoid the dilemma to fully unfold) or be more “reactive” to an already unfolded dilemma. Reactive strategies take more effort to resolve the dilemma (Duckworth, Gendler, & Gross, 2016). This is reminiscent of classic work by Mischel and colleagues, who mapped a number of similar strategies from their delay-of-gratification studies in children (Mischel, Shoda, & Rodriguez, 1989). However, a more solid evidence base to serve as a foundation for self-control interventions is still needed to support these ideas on strengthening strategies for self-control.

The contemporary view on trait self-control as going beyond effortful inhibition also holds implications for mechanisms of change that feed into self-control interventions. Trait self-control is considered to be relatively stable over time within an individual. However, this does not mean that there is no potential for improvement. Self-control interventions in this area have mainly focused on enhancing trait self-control by making self-control exertion more habitual and training the inhibition of impulsive tendencies toward short-term gratification. Improving the inhibitory part of trait self-control can potentially be achieved by direct training of “inhibitory control” as a core component of executive functioning (Diamond & Lee, 2011; Hofmann, Schmeichel, & Baddeley, 2012). Classic paradigms that have been used to gauge and train inhibitory self-control are go/no-go tasks (Donders, 1969) and stop-signal tasks (Lappin & Eriksen, 1966). Go/no-go tasks typically consist of a neutral set of stimuli and a set of target stimuli that are related to the undesired behavior that would need to be inhibited. Participants are instructed to respond as fast as possible (e.g., by pressing a button) to the neutral stimuli (go). Participants are also instructed to *not* respond to target stimuli (no-go). By repeating this for a number of trials, an association between inhibition and the target behavior is built that can carry over to actual behavior outside the task (e.g., Houben et al., 2011; Jones & Field, 2013; Veling, Aarts, & Papies, 2011). Stop-signal tasks typically also consist of neutral stimuli and target stimuli related to the undesired behavior. Participants need to categorize both types of stimuli as quickly as possible, except when there is a so-called stop signal (e.g., visually or auditory) presented right after the stimulus. A stop signal thus means that participants need to inhibit their already initiated response to the stimulus. This would lead to an association between “target” and “stop” that may again carry over into subsequent target behavior (Lawrence et al., 2015). However,

in spite of initial promising findings, recent research has convincingly demonstrated that this kind of self-control training has little or no transfer effects, making it a poor candidate for implementation into self-control interventions (Jones et al., 2018).

A different type of inhibition training has been inspired by the strength or limited resource model of self-control (Baumeister et al., 1998; Baumeister & Vohs, 2016). This model understands self-control as the ability to control dominant responses such as impulses and emotions and thus heavily focuses on inhibition as the key characteristic of self-control (Baumeister, 2014). According to the model, exerting self-control draws on a domain-general and limited resource, which leads to depletion of the resource and an increased risk of subsequent failure after initial attempts at self-control. The bulk of work on the strength model of self-control is concerned with within-person fluctuations in self-control performance (Frieese et al., 2019; Inzlicht & Frieese, 2019). A smaller number of studies has examined the idea that self-control could be improved with practice. Following the frequently used metaphor that self-control works like a muscle or a kind of strength, the model posits that temporary demands may “weaken the muscle,” whereas repeated training would lead to a “stronger muscle” (Muraven, Baumeister, & Tice, 1999). Training tasks may involve a variety of exercises aimed at repeatedly overriding dominant responses or inhibiting impulses. For example, participants have been instructed to use their nondominant hand for everyday tasks (Miles et al., 2016), control their language use (Finkel et al., 2009), or utilize a handgrip several times a day until exhaustion of hand muscle strength (Job, Frieese, & Bernecker, 2015). After repeatedly performing these self-control acts over a period of time, self-control should improve. Training success is primarily inferred in two ways: either from greater overall self-control strength as indicated by better performance in

self-control tasks or from reduced susceptibility to ego depletion effects, reflecting greater stamina in the face of high self-control demands. Importantly, because self-control is believed to be a domain-general construct, the strength model suggests that practicing self-control in one domain should lead to broad improvements in other domains requiring self-control. Whereas the strength model has inspired the majority of self-control interventions, it should be noted that it has been questioned on many occasions along with the implied notion of a “limited resource” (De Ridder, Kroese, & Gillebaart, 2018; Frieese et al., 2019). An alternative explanation for the mechanism behind training effects based on the strength model may be that people create adaptive routines as a result of repeated engagements in tasks that originally required effortful inhibition (De Ridder et al., 2019).

#### 40.4 Evidence Base

In order to create a good overview of the current state of self-control training literature, it is useful to discuss the evidence for self-control training on two distinct levels (De Houwer, 2011; Gieseler, Loschelder, & Frieese, 2019). The behavioral level refers to improvement in self-control behavior as a result of an intervention, such as those mentioned in Section 40.3. In contrast, the process level focuses on the psychological processes that mediate or explain the behavioral effect of self-control training on self-control outcomes. Even though the literature on self-control interventions is growing, evidence on both levels of analyses is still relatively scarce.

Looking first at habits as a way of improving trait self-control, there is a limited number of studies that have tested whether changes in habitual exertion of self-control lead to changes in self-control capacity over time (De Ridder et al., 2019; Gillebaart et al., 2019). Results from these studies are promising. At the behavioral level, an increase in self-control capacity has been

observed as a result of a self-control interventions focusing on regular practice of self-chosen self-control behavior in different domains (e.g., health, interpersonal behavior; De Ridder et al., 2019). At the process level, repetition, a core component of habit formation (Verplanken & Orbell, 2003; Chapters 13 and 41, this volume), of both self-control behaviors (De Ridder, et al., 2019) and improved responding to self-control dilemmas (Gillebaart et al., 2019) seems to drive these improvements in general capacity for self-control. However, these studies are a starting point rather than a solid evidence base and more research is needed to corroborate and extend them.

A second direction for improving trait self-control is inhibitory control training tasks. As mentioned, go/no-go and stop-signal tasks have been demonstrated to affect subsequent target behavior such as drinking alcohol or eating unhealthy food at the behavioral level (e.g., Jones & Field, 2013; Veling et al., 2011). Meta-analyses have revealed a small but significant effect of these types of training (Allom, Mullan, & Hagger, 2016; Jones et al., 2016), with stronger effects for go/no-go compared to stop-signal-based training programs (Allom et al., 2016). However, beneficial effects were only demonstrated immediately after the training – questioning their longevity (Allom et al., 2016) – and primarily for participants who were motivated for behavior change (Jones et al., 2016). At the process level, there is a need for further research on the underlying processes of these types of interventions. For example, there is debate about the mechanisms underlying effects of training on go/no-go tasks on self-control improvements, which could be attributable to decreased affective associations (Veling et al., 2017) rather than increased inhibitory control (Jones et al., 2016).

A recent preregistered randomized controlled trial went beyond the proof-of-concept studies summarized in existing meta-analyses (Jones et al., 2018). In this study, heavy drinkers were

assigned to one of three training conditions (alcohol-specific go/no-go, alcohol-specific stop-signal, general stop-signal) or an active control condition (categorizing alcohol and stationary pictures without requirement for inhibition). Participants attended up to fourteen training sessions over a four-week period and recorded their alcohol consumption. Results revealed that all groups reduced their alcohol consumption but there was no specific effect of any training condition on either alcohol consumption, inhibitory control, or affective associations with alcohol. These findings highlight that the empirical evidence and theoretical understanding of inhibitory control training do not yet warrant recommendations for interventions in applied contexts.

A similar picture emerges for self-control training interventions based on the strength model of self-control. Two recent meta-analyses have summarized the current evidence for this kind of interventions that seek to train the self-control “muscle” (Beames, Schofield, & Denson, 2018; Friese et al., 2017). Both meta-analyses included only studies that employed a self-control training entailing repeated control over dominant responses, measured self-control outcomes in a different domain than the training, and assessed outcomes at least one day after the final training session. Average effect sizes were  $g = 0.30$  (Friese et al., 2017) and  $g = 0.36$  (Beames et al., 2018), falling within the small-to-medium range and a bit smaller than the average effect in social psychology (Richard, Bond, & Stokes-Zoota, 2003). One particularly regrettable shortcoming of this literature from a practical perspective is that only a minority of studies included a follow-up and the ones that did employed only a few days after the intervention ended. As a result, current evidence is not sufficient to provide a conclusive evaluation to estimate the longevity of the effects of this kind of self-control training. For details on the meta-analytic results of this type of intervention, see Sidebar 40.1.

#### Sidebar 40.1 Meta-analytic evidence on self-control training

Two meta-analyses have explored the effects of self-control training (i.e., overriding a predominant response) on self-control outcomes (Beames et al., 2018; Friese et al., 2017). In these meta-analyses, several aspects of self-control training studies were considered. For example, various types of training were defined (computerized inhibitory control training, nondominant hand tasks, squeezing a hand strength training device, posture training, and dieting instructions) but these different types did not differ significantly in their effectiveness. Similarly, length of training did not change effectiveness and no differences were found for outcomes in affect and well-being, inhibitory control (before or after a laboratory self-control task intended to weaken momentary self-control capacity), physical persistence, and health behavior. Furthermore, outcomes that were measured in the lab were similar to those measured in real-life settings and effectiveness did not differ between behavioral, self-reported, or cognitive outcomes. The type of incentive for participation also did not moderate effects. Note, however, that some of these nonsignificant moderator analyses may well be due to a lack of statistical power: less than thirty-five studies were eligible for inclusion in the meta-analyses.

Some other factors did impact the training results: Published studies reported bigger effect sizes compared to unpublished studies; studies with active control conditions showed smaller effects than studies with inactive control conditions; bigger participant samples demonstrated smaller effects than smaller participant samples; and research groups that included proponents of the strength model reported larger effect sizes than other research groups. Finally, the distinction between self-control strength (self-control exertion without depletion) and self-control stamina (self-control exertion after depletion) proved meaningful: Self-control training affected self-control stamina to a significantly larger extent than it affected self-control strength.

In summary, evidence for the effectiveness of self-control training is promising but many questions remain unanswered with respect to the robustness and longevity of the effects on behavior change. In particular, evidence at the process level is largely absent. It is unclear as to which mediating variables and processes explain observed training effects. A multitude of processes that might be involved have been suggested, such as improved goal setting or greater self-efficacy (Inzlicht, Legault, & Teper, 2014), increased motivation for self-control (Beames et al., 2018), and enhanced self-control beliefs (Berkman, 2018). To date, none of these proposed mechanisms has been conclusively tested

empirically. More research is needed that (1) focuses on plausible boundary conditions of the training effect (e.g., change motivation in participants); (2) examines potential mechanisms, including a closer examination of expectancy effects; and (3) goes beyond small-scale proof-of-concept studies and takes a more comprehensive approach in larger nonstudent samples.

#### 40.5 Preliminary Guidelines for Self-Control Interventions

In terms of establishing a guideline that describes typical means of delivery, target audience and behavior, enabling and inhibiting factors, training

### Sidebar 40.2 Example of a self-control intervention protocol

Studies on self-control interventions have demonstrated that practicing self-control for a specified period of time (often two weeks) in one domain – for example, by using one’s nondominant hand for daily routines, avoiding sweets, or squeezing a spring-loaded handgrip trainer – can lead to improvement in another unrelated domain, as assessed by performance on laboratory tasks under ego depletion or by self-control behavior in or outside the lab (for meta-analytic evidence, see Friese et al., 2017). Very few studies have employed more meaningful training tasks that speak to members of the community and that are engaging for a long period of time. One example is a study on improving the capacity for self-control (De Ridder et al., 2019) that required participants to regularly practice a behavior they considered personally important but thus far had not managed to perform on a regular basis. They were provided with a choice of behaviors relating to either health, interpersonal, financial, or environmental issues and were asked to indicate in which particular contexts they wanted to practice (e.g., eating fruit when having breakfast, being patient when talking to a friend, saving money when in the supermarket, or recycling when tidying up). It was emphasized that they should choose a behavior and context that allowed them to practice on a daily basis (e.g., when they chose exercise, it was explained that a ten-minute walk was more feasible than an hour at the gym). The findings from this study show that practicing these tasks for about four months led to a considerable improvement in self-control capacity.

and skills required, intensiveness, and evaluation of fidelity, more robust evidence is required than the present state of the research literature can provide. Before recommendations can be made for translating self-control interventions into a comprehensive protocol that can be applied in real-life settings, more systematic research is needed on the different potential pathways to self-control improvement. A handful of preliminary guidelines based on the currently available evidence on self-control interventions are described in Sidebar 40.2.

#### 40.5.1 Typical Means of Delivery

There are several means to deliver self-control interventions. All training programs described in this chapter either involve tasks that are provided in person by a trainer or facilitator or involve

tasks that people can perform at home after instruction by a trainer or facilitator. Internet interventions or regular practice with the help of a smartphone or portable device “app” (or registration of completed tasks by “app”) have also been employed (see Chapter 29, this volume). These tasks involve either training of inhibitory behavior or prioritization of goal-directed behavior by frequent practice, as described in previous sections. However, to date, most self-control interventions have been delivered as part of a scientific study, primarily in student populations, and have therefore not been employed in the context of a regular intervention for the general public. Moreover, these studies typically employ lab tasks (such as solving anagrams), which might not be very involving for people outside academia (De Ridder et al., 2019), with the exception of studies that aim to engage people

in practicing tasks that most people would recognize as tedious but need-to-be-done jobs (such as folding one's clothes before going to sleep, doing the dishes, or keeping a record of personal finances; De Ridder et al., 2019; Muraven et al., 1999). Future research on self-control interventions should spend more attention on these kinds of meaningful tasks that speak to motivation for self-control. Different from existing interventions (e.g., inhibition training or strengthening the self-control resource) that posit that task relevance is not important, this new perspective suggests that meaningfulness of training tasks does matter.

### 40.5.2 Target Audience and Behaviors

The majority of intervention research on self-control interventions has employed student samples. Only a minority has involved community samples and many of those interventions did not prove effective in these broader samples (Beames et al., 2018), with the exception of a few interventions that demonstrated improvement in self-control capacity in at-risk populations in the general community (De Ridder et al., 2018; Wang, Raoa, & Houserb, 2017). Training tasks may target a broad variety of behaviors but many interventions are aimed at appetitive behaviors such as food and alcohol consumption (e.g., Allom et al., 2016; Friese et al., 2011). The focus on these latter types of behaviors is unsurprising, given that many people experience problems with regulating their appetites (Hofmann, Vohs, & Baumeister, 2012). However, self-control interventions in other behavioral domains such as personal finances, social behavior, media use, or procrastination should be considered in more detail, as many people experience self-control problems in these areas of life as well.

### 40.5.3 Enabling or Inhibiting Factors

As discussed in this chapter, a clear overview of factors that may moderate training effectiveness

is difficult to identify at this stage, as most evaluations of intervention effectiveness focus on establishing behavioral effects without considering personal characteristics (e.g., motivation for self-control, capacity for self-control; De Ridder et al., 2019) or contextual aspects (e.g., poor living circumstances, personal circumstances; Watts, Duncan, & Quan, 2018) that may promote training adherence or effectiveness. Also, cultural factors may be relevant, as recent research has suggested that, for example, in Asian cultures exercising self-control is regarded as energizing rather than as requiring effort (Savani & Job, 2017). These factors deserve more attention in future research.

### 40.5.4 Training and Skills Required

Ideally, self-control interventions should be aimed at people with poor self-control skills or a lack of personal resources as they may benefit most from improving self-control. However, at this stage, it is unclear to what extent people who are struggling with self-control issues, such as those with problems with alcohol abuse, excessive food intake, or financial matters, are even interested in training self-control or capable of performing self-control training tasks. An experience sampling study on self-regulation in a community sample revealed that people with low self-control dropped out of the study at an early stage (Prinsen et al., 2018), demonstrating that it may not be so easy to involve participants who may benefit the most.

### 40.5.5 Intensiveness and Fidelity

Formats for self-control interventions are, generally speaking, not very intensive and comprise a limited number of training sessions in a limited time frame, mostly lasting for two weeks or less, in a lab setting or online with easy-to-perform tasks. Notwithstanding this low-intense format, adhering to training tasks and/or attending



sessions may be problematic for participants with initially low levels of self-control (Prinsen et al., 2018), suggesting that even low-intensity formats of self-control interventions should pay attention to making training involvement an engaging activity. A recent study on self-control practice that involved personally relevant training tasks revealed that practicing self-chosen tasks was a reason for participants to persist with the intervention for a period of almost four months (De Ridder et al., 2019).

## 40.6 Further Requirements for a Step-by-Step Guide

Considering the overall limited and inconclusive evidence for behavioral effects of self-control training, and the lack of insight into its working mechanisms, the compilation of a detailed step-by-step guide is largely dependent on the findings of future research. This section includes a list of issues that need to be clarified before such a step-by-step guide can be construed.

### 40.6.1 Working Mechanisms

Studies on self-control training have mainly focused on documenting the behavioral effects of these interventions, precluding insights into the processes that may mediate these effects. Trait self-control improvement studies have given a first inkling as to the nature of potential mediating processes (i.e., behavioral repetition leading to self-control routines, De Ridder et al., 2018; responsivity to self-control dilemmas, Gillebaart et al., 2019) but the remainder of studies shows no or inconclusive findings on underlying processes. Similarly, in the area of state self-control training, the underlying processes remain unclear. Before using self-control intervention programs based on these studies, there is first a need to focus not only on further establishing the effectiveness but also on unravelling potential mediating and moderating processes.

### 40.6.2 Sustainability of Effects

Self-control is required for achieving one's long-term goals in the face of temptation. This means that developing self-control interventions for those who struggle with long-term goal pursuit is only viable when their effects are sustained over a longer period of time. In turn, this implies that more longitudinal studies should be done to test self-control training. Training studies based on the strength model of self-control typically do not go beyond two weeks (Friese et al., 2017), with the exception of a six-week training reported in Miles et al. (2016), which may be too short for determining effects in terms of goal accomplishment (e.g., health goals usually need more than a few weeks to be achieved). Initial longitudinal studies into trait self-control improvement have employed a longer time frame, with a duration up to 110 days (75 days on average), and suggest that positive effects do seem to hold over this period of time (De Ridder et al., 2019; Gillebaart et al., 2019).

### 40.6.3 Near vs. Far Transfer

Ideally, self-control interventions should improve a general self-control capacity, skill, or resource and not self-control performance that is specific to one domain. Improved documentation of near and far transfer is therefore a crucial and urgent research direction. Research on trait self-control improvement has investigated the effect of specific acts of self-control on the general capacity for self-control (De Ridder et al., 2019; Gillebaart et al., 2019) but more often is focused on the effects of training a very specific behavior in one domain without considering the effects on related domains (e.g., Veling et al., 2011; Wiers et al., 2010). The strength model of self-control assumes that self-control relies on a domain-general resource, suggesting that improving self-control by practice should lead to broad improvements in behaviors that require self-control across various domains (Baumeister, Vohs, & Tice, 2007). These kinds of

interventions therefore tend to focus on training self-control in one specific domain (e.g., using one's nondominant hand for everyday tasks) and testing self-control in another, usually equally specific domain (e.g., performance on a depletion task in the lab or self-reports on specific behaviors). Ideally, a more systematic study of near transfer (i.e., determine whether the effect of training one specific self-control behavior holds over time) and far transfer (i.e., determine whether the effect of training one specific self-control behavior generalizes to unrelated self-control behaviors) would give a better overview of how self-control interventions perform on a generalizability dimension and provide some clues for determining the specificity of training tasks.

## 40.7 Summary and Conclusion

Summarizing, self-control is essential in many behavioral domains, and improving self-control through interventions holds the potential for significant impact, specifically for those who struggle with low levels of self-control. However, although the current evidence base on self-control training is growing, it is, in its current form, insufficient to inform wide-scale implementation of interventions. Several identified gaps could be addressed in future research. For example, current findings do not provide conclusive evidence on near versus far transfer of training effects. Studying these effects in participant samples that resemble the target audience for self-control interventions (i.e., individuals that struggle with low self-control, are motivated to improve, and willing to partake in a self-control training program) would provide useful information. The latter aspect should not be underestimated: Many self-control studies are carried out with relatively privileged groups who may already possess high levels of self-control (e.g., students) and studies have shown early dropout from those with low self-control. In fact, the field needs to resolve and cultivate theoretical and empirical

debate on several aspects of self-control in addition to studying self-control training. For example, the introduction of habits as a component or process of self-control and the notion of situational strategies for self-control have provided a perspective on self-control that is broader than it has been for a long time. Integrating these different aspects in a self-control training regimen is a necessary step to take before conclusive practical advice can be given.

## References

- Adriaanse, M. A., Kroese, F. M., Gillebaart, M., & De Ridder, D. T. D. (2014). Effortless inhibition: Habit mediates the relation between self-control and unhealthy snack consumption. *Frontiers in Psychology*, 5, 444. <https://doi.org/10.3389/fpsyg.2014.00444>
- Allom, V., Mullan, B., & Hagger, M. (2016). Does inhibitory control training improve health behaviour? A meta-analysis. *Health Psychology Review*, 10, 168–186. <https://doi.org/10.1080/17437199.2015.1051078>
- Ayduk, O., Mendoza-Denton, R., Mischel, W., Downey, G., Peake, P. K., & Rodriguez, M. (2000). Regulating the interpersonal self: Strategic self-regulation for coping with rejection sensitivity. *Journal of Personality and Social Psychology*, 79, 776–792. <https://doi.org/10.1037/0022-3514.79.5.776>
- Baumeister, R. F. (2014). Self-regulation, ego depletion, and inhibition. *Neuropsychologia*, 65, 313–319. <https://doi.org/10.1016/j.neuropsychologia.2014.08.012>
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, 74, 1252–1265. <https://doi.org/10.1037//0022-3514.74.5.1252>
- Baumeister, R. F. & Vohs, K. D. (2016). Strength model of self-regulation as limited resource: Assessment, controversies, update. In M. Zanna & J. Olson (Eds.), *Advances in Experimental Social Psychology*, Vol. 54 (pp. 67–127). Cambridge, MA: Academic Press.

- Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science*, *16*, 351–355. <https://doi.org/10.1111/j.1467-8721.2007.00534.x>
- Beames, J. R., Schofield, T. P., & Denson, T. F. (2018). A meta-analysis of improving self-control with practice. In D. T. D. de Ridder, M. A. Adriaanse, & K. Fujita (Eds.), *Routledge International Handbook of Self-Control in Health and Well-Being* (pp. 405–417). Abingdon: Routledge. <https://doi.org/10.4324/9781315648576-32>
- Berkman, E. T. (2018). Self-regulation training. In K. D. Vohs & R. F. Baumeister (Eds.), *Handbook of Self-Regulation: Research, Theory and Applications* (3rd ed., pp. 440–457). New York: Guilford Press.
- Cheung, T. T., Gillebaart, M., Kroese, F. M., & De Ridder, D. T. D. (2014). Why are people with high self-control happier? The effect of trait self-control on happiness as mediated by regulatory focus. *Frontiers in Psychology*, *5*, 722. <https://doi.org/10.3389/fpsyg.2014.00722>
- De Houwer, J. (2011). Why the cognitive approach in psychology would profit from a functional approach and vice versa. *Perspectives on Psychological Science*, *6*, 202–209. <https://doi.org/10.1177/1745691611400238>
- De Ridder, D. T. D., Kroese, F. M., & Gillebaart, M. (2018). Whatever happened to self-control? A proposal for integrating notions from trait self-control studies into state self-control research. *Motivation Science*, *4*, 39–49. <https://doi.org/10.1037/mot0000062>
- De Ridder, D. T. D., 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. <https://doi.org/10.1177/1088868311418749>
- De Ridder, D. T. D., Van der Weiden, A., Gillebaart, M., Benjamins, J. S., & Ybema, J. F. (2019). *Just do it: Engaging in self-control on a daily basis improves the capacity for self-control*. Manuscript under review.
- Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science*, *333*, 959–964. <https://doi.org/10.1126/science.1204529>
- Donders, F. C. (1969). On the speed of mental processes. *Acta Psychologica*, *30*, 412–431. [https://doi.org/10.1016/0001-6918\(69\)90065-1](https://doi.org/10.1016/0001-6918(69)90065-1)
- Duckworth, A. L., Gendler, T. S., & Gross, J. J. (2016). Situational strategies for self-control. *Perspectives on Psychological Science*, *11*, 35–55. <https://doi.org/10.1177/1745691615623247>
- Duckworth, A. L., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, *92*, 1087–1101. <https://doi.org/10.1037/0022-3514.92.6.1087>
- Ent, M. R., Baumeister, R. F., & Tice, D. M. (2015). Trait self-control and the avoidance of temptation. *Personality and Individual Differences*, *74*, 12–15. <https://doi.org/10.1016/j.paid.2014.09.031>
- Finkel, E. J., DeWall, C. N., Slotter, E. B., Oaten, M., & Foshee, V. A. (2009). Self-regulatory failure and intimate partner violence perpetration. *Journal of Personality and Social Psychology*, *97*, 483–499. <https://doi.org/10.1037/a0015433>
- Friese, M., Frankenbach, J., Job, V., & Loschelder, D. D. (2017). Does self-control training improve self-control? A meta-analysis. *Perspectives on Psychological Science*, *12*, 1077–1099. <https://doi.org/10.1177/1745691617697076>
- Friese, M., Hofmann, W., & Wiers, R. W. (2011). On taming horses and strengthening riders: Recent developments in research on interventions to improve self-control in health behaviors. *Self and Identity*, *10*, 336–351. <https://doi.org/10.1080/15298868.2010.536417>
- Friese, M., Loschelder, D. D., Gieseler, K., Frankenbach, J., & Inzlicht, M. (2019). Is ego depletion real? An analysis of arguments. *Personality and Social Psychology Review*, *23*, 107–131. <https://doi.org/10.1177/1088868318762183>
- Fujita, K. (2011). On conceptualizing self-control as more than the effortful inhibition of impulses. *Personality and Social Psychology Review*, *15*, 352–366. <https://doi.org/10.1177/1088868311411165>
- 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. <https://doi.org/10.1037/pspp0000026>
- Gieseler, K., Loschelder, D. D., & Friese, M. (2019). What makes for a good theory? How to evaluate a theory using the Strength Model of Self-Control as an example. In K. Sassenberg & M. Vliek (Eds.), *Social Psychology in Action: Evidence-Based Interventions from Theory to Practice* (pp. 3–22). Heidelberg: Springer.
- Gillebaart, M., & Adriaanse, M.A. (2017). Self-control predicts exercise behavior by force of habit, a conceptual replication of Adriaanse et al. (2014). *Frontiers in Psychology*, 8, 190. <https://doi.org/10.3389/fpsyg.2017.00190>
- Gillebaart, M., Benjamins, J. S. Van der Weiden, A., Ybema, J. F., & De Ridder, D. T. D. (2019). *Practice makes perfect: Repeatedly dealing with response conflicts facilitates its identification and speed of resolution*. Manuscript under review.
- Gillebaart, M., & De Ridder, D. T. D. (2015). Effortless self-control: A novel perspective on response conflict strategies in trait self-control. *Social and Personality Psychology Compass*, 9, 88–99. <https://doi.org/10.1111/spc3.12160>
- Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. *Journal of Personality and Social Psychology*, 102, 1318–1335. <https://doi.org/10.1037/a0026545>
- Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science*, 4, 162–176. <https://doi.org/10.1111/j.1745-6924.2009.01116.x>
- 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. <https://doi.org/10.1111/jopy.12050>
- Hofmann, W., Schmeichel, B. J., & Baddeley, A. D. (2012). Executive functions and self-regulation. *Trends in Cognitive Sciences*, 16, 174–180. <https://doi.org/10.1016/j.tics.2012.01.006>
- 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, 582–588. <https://doi.org/10.1177/0956797612437426>
- Houben, K., Nederkoorn, C., Wiers, R. W., & Jansen, A. (2011). Resisting temptation: Decreasing alcohol-related affect and drinking behavior by training response inhibition. *Drug and Alcohol Dependency*, 116, 132–136. <https://doi.org/10.1016/j.drugalcdep.2010.12.011>
- Inzlicht, M., & Friese, M. (2019). The past, present, and future of ego depletion. *Social Psychology*, 50, 370–378. <https://doi.org/10.1027/1864-9335/a000398>
- Inzlicht, M., Legault, L., & Teper, R. (2014). Exploring the mechanisms of self-control improvement. *Current Directions in Psychological Science*, 23, 302–307. <https://doi.org/10.1177/0963721414534256>
- Job, V., Friese, M., & Bernecker, K. (2015). Effects of practicing self-control on academic performance. *Motivation Science*, 1, 219–232. <https://doi.org/10.1037/mot0000024>
- Jones, A., & Field, M. (2013). The effects of cue-specific inhibition training on alcohol consumption in heavy social drinkers. *Experimental Clinical Psychopharmacology*, 21, 8–16. <https://doi.org/10.1037/a0030683>
- Jones, A., Di Lemma, L. C., Robinson, E. et al. (2016). Inhibitory control training for appetitive behavior change: A meta-analytic investigation of mechanisms of action and moderators of effectiveness. *Appetite*, 97, 16–28. <https://doi.org/10.1016/j.appet.2015.11.013>
- Jones, A., McGrath, E., Robinson, E., Houben, K., Nederkoorn, C., & Field, M. (2018). A randomized controlled trial of inhibitory control training for the reduction of alcohol consumption in problem drinkers. *Journal of Consulting and Clinical Psychology*, 86, 991–1004. <https://doi.org/10.1037/ccp0000312>
- Lappin, J. S., & Eriksen, C. W. (1966). Use of a delayed signal to stop a visual reaction-time response. *Journal of Experimental Psychology*, 72, 805–811. <https://doi.org/10.1037/h0021266>
- Lawrence, N. S., Verbruggen, F., Morrison, S., Adams, R. C., & Chambers, C. D. (2015). Stopping to food can reduce intake: Effects of stimulus-specificity

- and individual differences in dietary restraint. *Appetite*, 85, 91–103. <https://doi.org/10.1016/j.appet.2014.11.006>
- Miles, E., Sheeran, P., Baird, H., Macdonald, I., Webb, T. L., & Harris, P. R. (2016). Does self-control improve with practice? Evidence from a six-week training program. *Journal of Experimental Psychology: General*, 145, 1075–1091. <https://doi.org/10.1037/xge0000185>
- Mischel, W., Shoda, Y., & Rodriguez, M. I. (1989). Delay of gratification in children. *Science*, 244, 933–938. <https://doi.org/10.1126/science.2658056>
- Moffitt, T. E., Arseneault, L., Belsky, D. et al. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences*, 108, 2693–2698. <https://doi.org/10.1073/pnas.1010076108>
- Muraven, M., Baumeister, R. F., & Tice, D. M. (1999). Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *The Journal of Social Psychology*, 139, 446–457. <https://doi.org/10.1080/00224549909598404>
- Prinsen, S., Evers, C., Wijngaards, L., Van Vliet, R., & De Ridder, D. T. D. (2018). Does self-licensing benefit self-regulation over time? An ecological momentary assessment study of food temptations. *Personality and Social Psychology Bulletin*, 44, 914–927. <https://doi.org/10.1177/0146167218754509>
- Richard, F. D., Bond, C. F., & Stokes-Zoota, J. J. (2003). One hundred years of social psychology quantitatively described. *Review of General Psychology*, 7, 331–363. <https://doi.org/10.1037/1089-2680.7.4.331>
- Savani, K., & Job, V. (2017). Reverse ego-depletion: Acts of self-control can improve subsequent performance in Indian cultural contexts. *Journal of Personality and Social Psychology*, 113, 589–607. <https://doi.org/10.1037/pspi0000099>
- 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. <https://doi.org/10.1111/j.0022-3506.2004.00263.x>
- Trope, Y., & Fishbach, A. (2000). Counteractive self-control in overcoming temptation. *Journal of Personality and Social Psychology*, 79, 493–506. <https://doi.org/10.1037//0022-3514.79.4.493>
- Veling, H., Aarts, H., & Papiés, E. K. (2011). Using stop signals to inhibit chronic dieters' responses toward palatable foods. *Behaviour Research and Therapy*, 49, 771–780. <https://doi.org/10.1016/j.brat.2011.08.005>
- Veling, H., Lawrence, N. S., Chen, Z., Van Koningsbruggen, G. M., & Holland, R. W. (2017). What is trained during food go/no-go training? A review focusing on mechanisms and a research agenda. *Current Addiction Reports*, 4, 35–41. <https://doi.org/10.1007/s40429-017-0131-5>
- Verplanken, B., & Orbell, S. (2003). Reflections on past behavior: A self-report index of habit strength. *Journal of Applied Social Psychology*, 33, 1313–1330. <https://doi.org/10.1111/j.1559-1816.2003.tb01951.x>
- Wang, J., Raoa, Y., & Houserb, D. E. (2017). An experimental analysis of acquired impulse control among adult humans intolerant to alcohol. *Proceedings of the National Academy of Sciences*, 114, 1299–1304. <https://doi.org/10.1073/pnas.1610902114>
- Watts, T. W., Duncan, G. J., & Quan, H. (2018). Revisiting the Marshmallow Test: A conceptual replication investigating links between early gratification delay and later outcomes. *Psychological Science*, 29, 1159–1177. <https://doi.org/10.1177/0956797618761661>
- Wiers, R. W., Rinck, M., Kordts, R., Houben, K., & Strack, F. (2010). Retraining automatic action-tendencies to approach alcohol in hazardous drinkers. *Addiction*, 105, 279–287. <https://doi.org/10.1111/j.1360-0443.2009.02775.x>