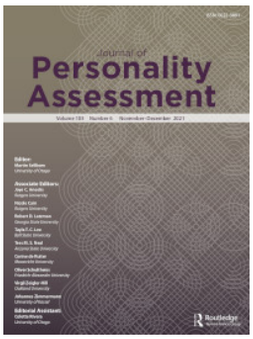

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Moving beyond Inhibition: Capturing a Broader Scope of the Self-Control Construct with the Self-Control Strategy Scale (SCSS)

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ABSTRACT

The purpose of the present research was to develop a more comprehensive measure of self-control that reflects recent theoretical advancements that extend beyond inhibition. Across six samples ($N = 1,946$, 48.95% males, Ages 18-76, US-MTurkers/Israelis), we sought to develop and validate the Self-Control Strategies Scale (SCSS), as well as examine its predictive validity across important life domains (e.g., weight, physical activity, savings). The SCSS is comprised of eight self-control strategies that represent three categories: *anticipatory control* (situation selection, reward, punishment, pre-commitment), *down-regulation of temptation* (distraction, cognitive change, acceptance), and *behavioral inhibition*. Results indicate that there was a strong association between the widely used Brief Self-Control Scale (BSCS). and the behavioral inhibition strategy of the SCSS. While the behavioral inhibition strategy was a strong and consistent predictor of most self-control related outcomes, results further indicate that in some domains, but not others, certain strategies may be beneficial whereas others may be detrimental. While inhibition remains to be an important factor of self-control, our findings point to the importance of adapting the use of different strategies to different domains. The SCSS can therefore be used to gain a more fine-grained understanding of the self-control construct.

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Self-control is a core aspect of human functioning that has been linked to many important life outcomes, including healthy eating, greater marital satisfaction, better income and savings, academic achievement, and increased work performance (Duckworth & Seligman, 2005; Hofmann et al., 2008, 2014; Mischel et al., 1988; Moffitt et al., 2011; Tangney et al., 2004). Past research adopted the view of self-control as an ability, relating it to effortful inhibition (de Ridder et al., 2012; Milyavskaya & Inzlicht, 2018; Tangney et al., 2004) but also to other executive functions (Hofmann et al., 2012). Interventions for improving self-control (and executive functions) has been focused on improving this ability, yet training it found very small effects, if any at all (Friese et al., 2017; Kassai et al., 2019; Sala & Gobet, 2019).

Recent research, however, suggests that self-control may be more than mere inhibition and instead proposes that different strategies (e.g., engaging in more preventative behaviors) can help people to achieve their goals (e.g., Duckworth et al., 2016; Fujita, 2011; Gillebaart & de Ridder, 2015; Hofmann & Kotabe, 2012; Milyavskaya & Inzlicht, 2018). In light of these theoretical advancements, the purpose of the present research is to develop a more up-to-date measure of self-control that includes components that expand beyond effortful inhibition.

How is self-control currently measured?

The construct of self-control has become increasingly popular in psychological science, and so it is no surprise that there are many ways to operationalize it. Perhaps the most prevalent measure for self-control is the Brief Self-Control Scale (BSCS; Tangney et al., 2004). Additional measures include (but are not limited to) the Self-Control Behavior Inventory (Fagen et al., 1975), the Self-Control Questionnaire (Brandon et al., 1990), and the Self-Control Schedule (Rosenbaum, 1980). Constructs with similar properties include various measures of impulsivity (e.g., Eysenck et al., 1985; Whiteside & Lynam, 2001) and delay of gratification (e.g., Mischel et al., 1989). However, since the time of its conception, the BSCS has become the gold standard self-report measure (e.g., de Ridder et al., 2012; Hofmann et al., 2012).

The BSCS was constructed based on the four major domains of self-control – controlling thoughts, emotions, impulses, and performance (Baumeister et al., 1994). As a result, its central focus is effortful inhibition (Tangney et al., 2004, p. 274) . Demonstrating the role effortful inhibition has in self-control, various aspects of self-control were found to be associated with inhibition measures such as the stop

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signal task and the anti-saccade task (e.g., Nederkoorn et al., 2010; Payne, 2005, but see Duckworth & Kern, 2011 for only low to moderate correlations).

Moving beyond inhibition

Whereas the effortful inhibition of impulses does indeed play an important role in the process of self-control, recent theorizing and research suggests that other, less effortful strategies may also be at play (Duckworth et al., 2016; Fujita, 2011; Hofmann et al., 2015; Magen & Gross, 2010; Trope & Fishbach, 2005). For example, rather than using brute force willpower, people who have the goal of eating healthy might instead hide their favorite cookies in the back of the cupboard (i.e., "out of sight, out of mind"), or students wanting to complete their assignment will decide to reward themselves with their favorite TV show once they finish reading a chapter. Focusing on a measure of effortful behavioral inhibition may have led researchers to overlook other possible strategies that people use in the pursuit of important goals (Fujita, 2011; Hofmann & Kotabe, 2012; Milyavskaya & Inzlicht, 2018).

Recent research indicates that self-control is not always about resistance in the face of temptation, but instead people can also develop habits or strategies to reduce their encounter with temptations in the first place (e.g., de Ridder et al., 2012; Duckworth et al., 2016; Gillebaart & de Ridder, 2015; Hofmann & Kotabe, 2012). For example, when anticipating a future self-control conflict, people may simply modify the situation to reduce the presence of temptation (e.g., Duckworth et al., 2016; Ent et al., 2015; Hofmann & Kotabe, 2012; Magen & Gross, 2010). Or they may pre-commit themselves to behave in accordance with their long-term goals or have a system of rewards and punishments set up prior to the conflict (Fishbach & Shen, 2014; Hofmann & Kotabe, 2012; Trope & Fishbach, 2000, 2005). Alternatively, people can also engage in several regulatory strategies to cope with temptation once it is present. While this includes the more traditional strategy of using "willpower" to simply resist, alternative strategies have been proposed. For example, people can also distract themselves from the temptation (e.g., Friese et al., 2010; Mischel et al., 1972) or change the way they think about it (Hofmann & Kotabe, 2012; Magen & Gross, 2010; Myrseth & Fishbach, 2009). People may also accept (rather than suppress) their feelings toward the temptation, a strategy that was found beneficial to regulate emotions (Baer, 2006; Braams et al., 2012).

Importantly, it should be noted that people are only expected to exert self-control in the face of temptations that conflict with important personal goals. While we propose that people may use many different strategies to minimize or overcome temptations in order to achieve their goals, in the context of the present research we suggest that these particular strategies are especially relevant when such self-control conflicts are present (Atkinson, 1954; Kruglanski et al., 2002; Locke & Latham, 2002; Richter et al., 2016).

Given that the current "gold standard" measure of trait self-control, the BSCS, represents a unidimensional construct focusing only on inhibition, we propose that there is a need to develop a more comprehensive measure that includes these more nuanced *strategies* of self-control. In an initial attempt of this idea, Hennecke et al. (2018) used a bottom-up approach to generate an impressive set of strategies people use to help them persist in aversive activities in their daily life. Unfortunately, this set does not comprise a comprehensive questionnaire that can be readily administered (but rather items can be selected based on the researcher's interests). Another recently developed strategy-based questionnaire, is the Tempest Self-Regulation Questionnaire for Eating (TESQ-E) (De Vet et al., 2014), yet this measure is specifically designed to be used in the context of eating behaviors (e.g., "If I pass a bakery, I ignore the smells of tasty foods") and cannot be readily adapted to other contexts. Expanding on these limitations, we aimed to create a more general tool that appropriately captures the many strategies of self-control that can also be used across all contexts. The development of such a tool holds potential not only for characterizing the prevalence of different strategies in everyday life, but also by characterizing the prevalence of such strategies in different domains in which self-control is required. A more fine-grained analysis of the effects of specific strategies on self-control outcomes may ultimately yield novel insights into how different self-control strategies interact with the person and the situation to produce beneficial or maladaptive outcomes.

Overview of the present study

The purpose of the present research was to develop a more comprehensive self-report measure of self-control that reflects recent theoretical advancements, specifically including a broad range of self-control *strategies* that extend beyond the traditional focus on inhibition *ability*. To achieve this objective, we collected data from six samples in order to develop and validate the Self-Control Strategies Scale (SCSS). In Samples 1a-1c, we generated a pool of candidate items derived from the literature on self-control and then used item-reduction to formulate the SCSS. We hypothesized that the SCSS would be comprised of three higher-order components – anticipatory control, down-regulation of temptation, and behavioral inhibition – all of which should be moderately correlated with one another. While behavioral inhibition serves as its own component, we expected that both anticipatory control and down-regulation of temptation would each be represented by three lower-order strategies. For anticipatory control, these strategies include situation selection, stimulus control, and imposing contingencies, whereas down-regulation of temptation includes distraction, cognitive change, and acceptance/suppression. An overview of our hypothesized model is presented in Table 1. Based on the recommendations of Fabrigar et al. (1999) and Brown (2015), we then validated our newly developed measure in independent samples. Specifically, the SCSS was validated cross-culturally in both US (Sample 1b) and Israeli (Sample 1c) samples to provide further evidence of external validity. Finally, Samples 2a-2c established the predictive validity of the SCSS across a variety of domains. We hypothesized that the SCSS would

Table 1. Pre-registered hypothesized measurement model.

Citation	Construct – predicted model Anticipatory Control	Construct – final model of the SCSS Anticipatory Control
Magen and Gross (2010), Duckworth et al. (2016)	**Situation selection**	**Situation selection**
Ent et al. (2015), Hofmann and Kotabe (2012), Magen and Gross (2010)	**Stimulus control**	
Fishbach and Shen (2014), Hofmann and Kotabe (2012), Myrseth and Fishbach (2009), Trope and Fishbach (2000, 2005)	**Imposing contingencies**	**Reward** **Punishment** **Pre-commitment**
	Down-regulation of Temptation	**Down-regulation of Temptation**
Friese et al. (2010), Magen and Gross (2010), Mischel et al. (1972)	**Distraction**	**Distraction**
Hofmann and Kotabe (2012), Magen and Gross (2010), Myrseth and Fishbach (2009)	**Cognitive change**	**Cognitive change**
Baer (2006), Braams et al. (2012), Gross and Levenson (1993), Davidson et al. (2003)	**Acceptance/ suppression**	**Acceptance**
de Ridder et al. (2011), Hoyle and Davisson (2013), Tangney et al. (2004)	**Behavioral Inhibition**	**Behavioral Inhibition**

improve the prediction of a variety of domain-specific outcomes, including self-control failure, weight-related measures (e.g., BMI, distance from ideal weight), engagement in physical activities (e.g., gym attendance, sports, exercise), and savings. We further examined convergent, divergent, and incremental validity against the field's current gold standard measure, the BSCS.

Statement of transparency

Apart from Sample 1c, collection all of the current samples was pre-registered on aspredicted.org (1a: https://aspredicted.org/6rm5s.pdf; 1b: https://aspredicted.org/vq8qd.pdf; 2a: https://aspredicted.org/d2gf6.pdf; 2b: https://aspredicted.org/ta3xh.pdf; 2c: https://aspredicted.org/cj3g7.pdf), including the hypothesized measurement model. However, some deviations from the pre-registration were required based on the results leading to the final construction of the scale. Most notably, we pre-registered an analysis plan that took an exploratory approach (i.e., a LEAPS regression analysis) to determine which self-control strategies were the strongest predictors of our focal dependent variables. Each analysis was tailored to specific samples from 2a-2c. However, we ultimately decided to pool all of the data and examine zero-order correlations and multiple regression coefficients (For by-sample analyses see Figures 1 and 2 and Supplementary Online Material – SOM). Any additional deviations from our pre-registration (see SOM), as well as our statistical R code (R Core Team, 2019), study materials, and data are freely available on OSF: https://osf.io/hpaxy/?view_only 30d88f74ffce4a908776a58954aaf735.

Method

Below we describe the specific process that we used to develop and validate the SCSS using six samples. An overview of the measures and sample characteristics for each individual sample can be found in Table 2.

For the exploratory and confirmatory factor analysis analyses, we aimed to collect a minimum of 10 participants for every item (74 items in Sample 1a, 39 items in Sample 1 b, and 38 items in Samples 1c, 2a-2c; see SOM for post-hoc power analyses, Wang & Rhemtulla, 2020 indicating adequate power). In the samples that were run online, we increased the sample size by ~15% due to our exclusion criteria. Regression analyses reported in this paper were high powered, with power > 99.9% based on G*Power calculations.

In all samples, we incorporated three items in the scale. These items asked participants to give a specific answer (see Figure 3). We pre-registered that a failure to give the correct answer in at least one of these items will lead to exclusion from analysis. We also pre-registered that we will use data of native English speakers (to assure language comprehension), age 18 and above (MTurkers have to be 18 or above). The number of participants excluded based on our pre-registered exclusions are reported in Table 2.

Stage 1 – development of the Self-Control strategies scale (SCSS)

We conducted a thorough literature review on self-regulation and self-control, which resulted in the identification of the primary strategies used in desire regulation (see Hofmann et al., 2015; Hofmann & Kotabe, 2012 for an overview, and Table 1 for specific studies). These strategies served as our hypothesized components and subscales, which were then used to generate an initial pool of 74 items (i.e., each subscale having at least 10 items; see OSF for the complete list). Following instructions that clarified key terms regarding self-control conflicts (e.g., explaining the difference between temptation and desire), participants rated the items on a 1 (*not at all*) to 5 (*very much*) Likert scale. For the initial validation (Sample 1a), participants completed our comprehensive list of 74 items which were presented in a random order. For the subsequent validation stage (Samples 1 b-1c and Samples 2a-2c), participants completed the resulting SCSS (the final scale is presented in the Figure 3).

Stage 1 - Results

Exploratory factor analysis (sample 1a)

Using MPlus (Muthén & Muthén, 2012), we conducted an exploratory factor analysis (EFA) using maximum likelihood

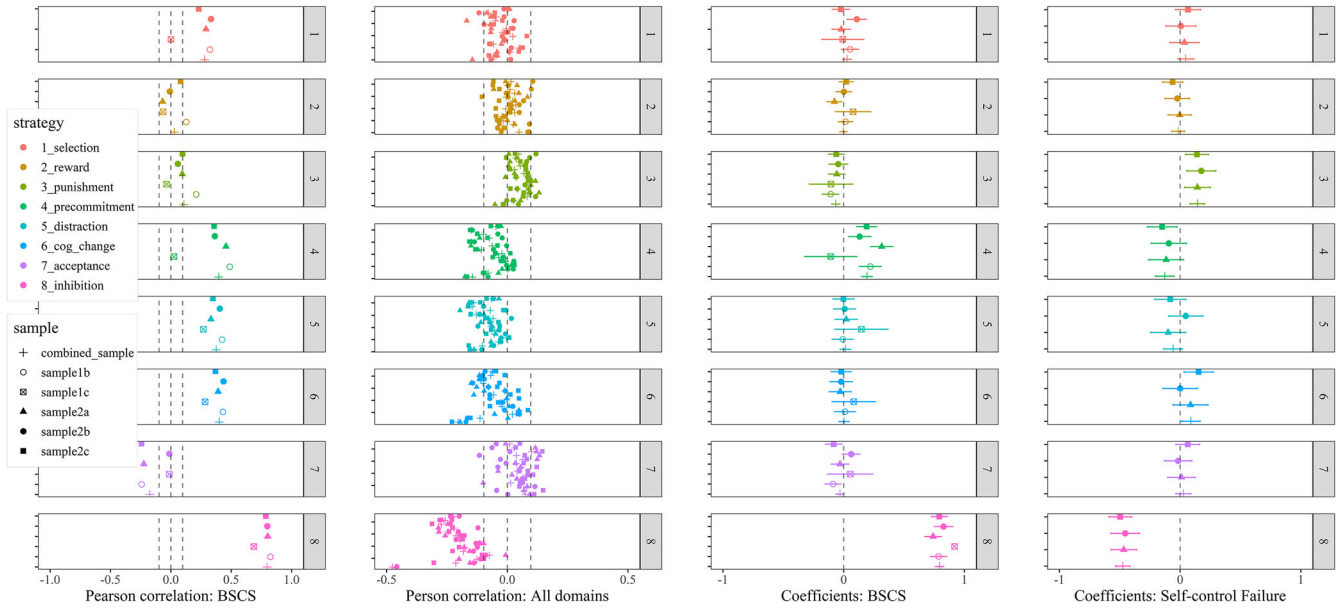

Figure 1. By sample analysis of (from left to right): correlations with BSCS, correlations failure in the different domains, coefficients of the SCSS strategies when predicting the BSCS, coefficients of the SCSS strategies when predicting self-control failure.

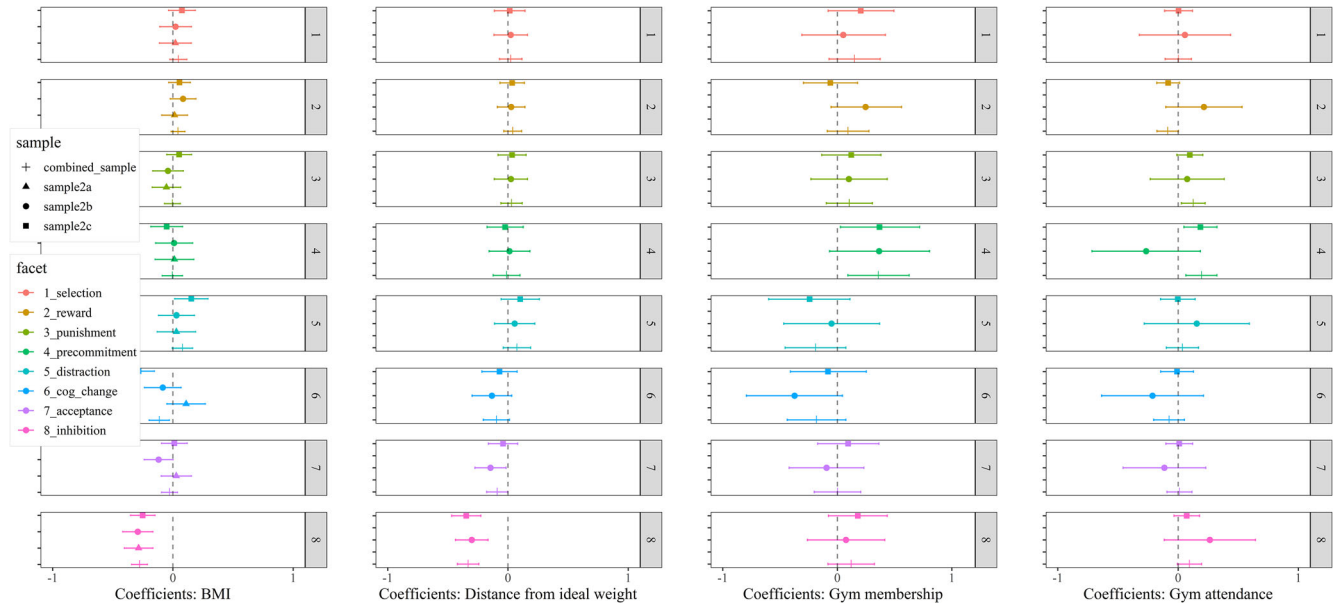

Figure 2. By sample analysis presenting coefficients of the SCSS strategies when predicting (from left to right): BMI, distance from ideal weight, gym membership and gym attendance.

estimation and geomin rotation on our initial pool of 74 items that was completed in Sample 1a[1]. As was pre-registered, we aimed to retain no more than 5 items per factor as our goal was to develop an easy-to-administer, parsimonious measure. To this end, we removed items with factor loadings below .40 and those that loaded on two or more factors. From this reduced set of items, we selected the 5 items which had the highest loadings. We only chose to retain items that loaded on the expected subscale (except for situation selection and stimulus control, as elaborated below). We therefore did not select items from Factor 2, which seemed to be a methods-related factor of reversed items (this factor included items from stimulus control, situation selection, and acceptance). Additionally, no items were selected from Factor 8, which was comprised of cognitive change items that seemed to be related to emphasizing the dark side of temptation.

Results of the EFA indicated 37 candidate items (see Table 1-SOM). These break down into eight strategies that slightly deviate from our hypothesized model. For anticipatory control, we initially hypothesized that this component would be comprised of three strategies – situation selection, stimulus control, and imposing contingencies. However, results indicated that situation selection and stimulus control load onto the same factor and were therefore combined into one final subscale (situation selection), which is consistent with how the two aspects are often treated in the literature (e.g., Duckworth et al., 2016). The strategy of imposing

Table 2. Overview of the sample characteristics and measures used in each sample.

	Sample 1a	Sample 1b	Sample 1c	Sample 2a	Sample 2b	Sample 2c
Sample Characteristics						
Main purpose	EFA	CFA	CFA	Validation	Validation	Validation
Sample size	892	456	150	443	446	603
Pre-registered exclusions:						
Not native speaker	13	7	0	13	11	4
Attention check failure	54	19	7	22	19	49
Final sample size (*n*)	794[6]	430	143	408	416	549
Participants	MTurk	MTurk	Undergrads	MTurk	MTurk	MTurk
Nationality	US	US	Israel	US	US	US
Age – *M* (*SD*)	36.24 (11.01)	34.18 (10.30)	24.44 (2.48)	34.47 (10.15)	36.29 (11.05)	35.64 (10.49)
Gender – % Female	50.00%	44.42%	74.67%	49.01%	49.28%	51.54%
Payment	2$	1.2$	Course credit	2$	2$	2$
Estimated completion time	15-20 min.	10-15 min.		15-20 min.	15-20 min.	15-20 min.
Date of data collection	Dec 2016	Feb 2017	Jun 2017	Aug 2017	Oct 2017	Mar 2018
Measures						
SCSS	+	+	+	+	+	+
Convergent validity						
BSCS		+	+	+	+	+
Predictive validity						
Self-control failure				+	+	+
BMI				+	+	+
Distance from ideal weight					+	+
Gym membership					+	+
Gym attendance					+	+
Sports					+	
Exercise						+
Savings						+

The following questionnaire is designed to measure your self-control. Before you start, we would like to clarify some of the terms we use in regarding self-control conflicts:
A self-control conflict is a conflict that arises when you face a **temptation/desire** (e.g., our favorite dessert, going out with friends, sales in our favorite store, etc.) when in pursuit of a **long-term goal** (e.g., maintaining our health, being a good parent, excelling at work/school, saving money, being a faithful spouse, etc.).
Temptations/desires may vary from inappropriate thoughts to inappropriate behaviors. Not every desire is necessarily a temptation, only those that you consider unwanted. For example, enjoying a dessert may be a perfect ending for a nice meal, unless you are hoping to maintain a diet. Then the dessert becomes a temptation that you hope to avoid.
People may behave differently in situations that involve self-control. They can be very self-controlled in some situations, but not so much in others. Therefore, it is possible that on some of the items on this scale, you will rate yourself as having high self-control and yet on other items you will rate yourself as having medium or low self-control.
Nevertheless, it is extremely important to us that you will be as honest and accurate as possible.

Anticipatory control:

Situation Selection/ Stimulus Control

1) I seek out situations in my life so that I will not face temptations
2) I distance myself from situations that could be tempting
3) I structure my life so that I can more easily avoid temptations
4) I alter my environment so that I will not face temptations.
5) When I am trying to achieve an important goal, I create a temptation free environment
6) I organize my environment so that I will not face temptations

Imposing contingencies (a subscale composed out of 3 sub-subscales):

Punishment

7) I usually don't create punishments for myself in case I fall into temptation. [R]
8) To make sure that I realize my plans and goals successfully, I impose sanctions on myself.
9) I penalize myself for breaking my own "personal contracts".
10) When pursing my long-term goals, I like to create "personal contracts" that involve rewards for success and penalties for failure.

Reward

11) I usually reward myself for accomplishing my long-term goals.
12) I reward myself for the achievement of a long-term goal.
13) When pursuing my goals, I reward myself for making progress.
14) When I set an important long-term goal I decide to reward myself if I achieve it.

Pre-commitment

15) When I want to achieve a goal, I take actions or impose restrictions on myself that make it almost impossible to fail.
16) I rarely commit myself to deadlines. [R]
17) I tell people about my long-term goals so that they can hold me accountable.
18) I commit myself in advance to goals I want to achieve (e.g., by committing to deadlines, by paying money in advance to activities I want to participate in).

Down-regulation of temptation:

Distraction

19) When I encounter a temptation, I shift my focus away from it.
20) When I face a temptation, I shift my attention away from it.
21) When I face a temptation, I redirect my thoughts away from it.
22) When I face a temptation I want to resist, I distract myself from it.
23) When unwanted desires come to my mind, I try to think about other things instead.

Cognitive Change

24) When I face an unwanted desire I control myself by changing the way I think about it.
25) When I want to feel less craving for a temptation, I change the way I think about the temptation.
26) When I'm faced with a temptation, I make myself think about it in a way that helps me become less tempted by it.
27) When I face an unwanted desire I think about it in a cold, detached, neutral way.
28) When I encounter a temptation I think about it in a different light.

Acceptance

29) When I want to feel less craving from a temptation I accept my cravings.
30) When I face a temptation I accept the craving for it.
31) Whenever I have an urge for something forbidden, I accept having this desire.
32) Even though there are temptations I prefer not to think about, I accept having thoughts about these temptations.

Behavioral Inhibition:

33) I find it easy to keep myself from acting on unwanted desires.
34) When I desire something that is not good for me, I have difficulty resisting it. [R]
35) I find it difficult to avoid doing certain things, even if they are bad for me. [R]
36) When I face a temptation there is a high likelihood I will resist it.
37) It is hard for me to control my behavior when I experience unwanted desires. [R]
38) I usually manage to control myself from acting on unwanted desires even if they are tempting.

Figure 3. The Self-Control Strategy Scale – instructions and items. Scale items were presented randomly. Three additional attention check items were embedded, thus making the scale include a total of 41 items. The attention check items always appeared in fixed positions: the 18th, 29th, and 37th positions. For the scale in qsf format (i.e., applied to Qualtrics) and in.docx format, including the attention items, see OSF.

contingencies was further split into three strategies, including reward, punishment, and pre-commitment. Because only three items loaded above the pre-registered cutoff (i.e., 0.40) on pre-commitment, we decided to select all the five items originally phrased as examining pre-commitment to allow for enough items to examine this strategy. For the down-regulation of temptation component, we initially hypothesized that it would be comprised of three strategies – distraction, cognitive change, and acceptance/suppression. However, results revealed that the suppression items negatively loaded onto the distraction subscale, although not quite as strongly as the distraction items, and thus were removed. The cognitive change items loaded on two factors. Because the items in one of these factors were more focused on the dark side of temptation (e.g., "When encountering a temptation I try to think about its negative effect on me")

and less focused on a cognitive change, we selected the three items that did focus on cognitive change and added two new items to reach five total items (e.g., "When I face an unwanted desire I think about it in a cold, detached, neutral way"). The acceptance items did indeed load onto their own separate factor, and so we decided to keep this subscale. Finally, results for the behavioral inhibition component came out as expected, such that the component itself represented the behavioral inhibition strategy. We chose six items for this subscale, because three items of the five items were reversed and we wished to reach a balance in positively and negatively worded items. The version of the SCSS submitted to the confirmatory factor analysis consisted of 38-items representing situation selection, reward, punishment, pre-commitment, distraction, cognitive change, acceptance, and behavioral inhibition (see Figure 3[2]).

Confirmatory factor analysis (samples 1 b-1c)

To validate the newly developed SCSS, we conducted a confirmatory factor analysis (CFA) using the R package lavaan (Rosseel, 2012) on the 38-item measure in an independent sample (Samples 1 b and 1c; see Brown, 2015; Fabrigar et al., 1999). In this analysis, we used a fixed factor method such that cross-loadings were prohibited and the variances of latent factors were fixed to 1 for model identification (Brown, 2015). Full information maximum likelihood estimation (FIML) was employed to account for missing data (Enders, 2001; Enders & Bandalos, 2001). As indicated in Table 3, CFA results across samples in both the US (Sample 1 b) and Israel (Sample 1c) provided evidence of good fit, which also replicated in subsequent validation samples (Samples 2a-2c). Additionally, the loadings for all items exceeded our cutoff criteria of 0.40, with the majority of them being much higher (above 0.70). Reliability of the subscales was also generally high ($\omega = .93$ for situation selection; $\omega = .90$ for reward; $\omega = .80$ for punishment; $\omega = .66$ for pre-commitment; $\omega = .90$ for distraction; $\omega = .87$ for cognitive change; $\omega = .82$ for acceptance; $\omega = .91$ for inhibition, see Table 6 for item inter-correlation and the SOM for an item-response analysis suggesting that all the scales measure a wide range of the latent variable with high reliability).

To further test the validity of the 8-factor structure of the SCSS, we compared it to a model in which every item loaded onto a single self-control factor. Our model was superior to that model, which tests whether a single factor can account for covariance among all of the items, $\Delta\ \chi^2\ (28) = 4598.2$, $p < .001$, providing strong support for our theoretical model.

Stage 2 – validation of the Self-Control strategies scale (SCSS)

Measures to assess the convergent and predictive validity of the SCSS

Trait self-control. Participants completed the Brief Self-Control Scale (13-items; Tangney et al., 2004). Responses were made on a five-point Likert scale ranging from 1 (not at all like me) to 5 (just like me).

Table 3. CFA Fit indices for the final 38-item Self-Control Strategies Scale across all samples.

	CFI	TLI	AIC	BIC	RMSEA	SRMR
Sample 1 b	.917	.909	40,951	41,528	.056	.065
Sample 1c	.866	.853	13,330	13,751	.061	.075
Sample 2a	.908	.898	39,753	40,323	.056	.063
Sample 2 b	.914	.905	39,893	40,465	.056	.063
Sample 2c	.915	.906	52,862	53,474	.055	.063

Self-control failure. Participants were presented with a list of 14 domains and were asked to choose one that is "highly important for you to stay controlled but you also often experience temptations." The list of domains included food, drinks (non-alcoholic), alcohol, coffee, tobacco, other substances, sex, media, spending/shopping, work/obligations, sleep, hygiene-related, time management, emotions and aggression (Hofmann et al., 2012). After choosing a domain, participants were presented with the following three questions assessing self-control failure (a method adapted from Job et al., 2015, for a recent use see, e.g., Ghoniem & Hofmann, 2021): (1) *How often did you fail to control yourself in this domain in the past week?* (2) *How often did you want to control yourself in this domain but couldn't do it in the past week?* (3) *How often did you give in to temptations in this domain in the past week?* After completing these items for their most important domain, participants then answered these same questions for the remaining 13 domains. Responses were made on a 1 (*never*) to 7 (*two or more times per day*) scale and were averaged for each domain to create an index for failure in within that domain. We then computed a composite score for self-control failure by averaging the self-control failure score in each domain ($\alpha = .84$).

Body weight. Participants were asked to indicate their height and weight, which were used to calculate body mass index (BMI). Because many factors may influence BMI, such as SES and genetic factors, given that weight and healthy eating is often a self-control goal for people, we also asked participants to indicate whether they were above, below, or at their ideal weight ("People usually have an ideal weight, which is the number of pounds they want to weigh (or should weigh). Are you above or below your ideal weight?"). For the purposes of the present research, we examined the data for those who reported that they were above their ideal weight.

Physical activity. Using a dichotomous (Yes/No) scale, participants first indicated whether or not they currently had a gym membership. Participants were then asked to indicate how often they go to the gym, how often they engage in sport activities, and how often they exercise within a given week. Responses for the latter three items were made on a 1 (I don't go to the gym) to 8 (more than 5 times a week) point scale.

Savings. Participants reported whether they contribute toward any savings programs by indicating how many of the savings account programs they regularly contribute to, including a savings account, a retirement account, or

another long-term savings plan, or if they do not regularly contribute to any of the above. Based on their answers we computed whether they contribute to no savings program (0), one savings program (1), two savings programs (2), or three or more savings programs (3)[3].

Goal importance. Participants were asked to indicate how important their goals were within the domains of physical activity (sports, exercise) and savings. Participants were presented with two items for each specific activity within a given domain, including whether it was important for them to do sports/exercise, and save money for the future, as well as the extent to which they would have liked to do sports/exercise, and save money for the future. Responses for the first item were made on a 1 (*not at all important*) to 5 (*extremely important*) scale, whereas responses for the second items were made on a 1 (*not at all*) to 5 (*to a high extent*) scale. To calculate an importance score for each domain, we averaged the two items together, with higher scores indicating greater goal importance.

Stage 2 - Results

Examining the relation between the SCSS and trait self-control

Descriptive statistics and correlations between trait self-control (measured by the BSCS) and the eight subscales of the SCSS across all six samples are presented in Table 4. Overall, most of the self-control strategies correlate with each other with the exception of acceptance, which has a small and negative correlation with the other strategies. The anticipatory strategies of situation selection, reward, punishment, and pre-commitment have a small to medium correlation with each other (r ranges from .18 to .51), and among the strategies aimed at the down-regulation of temptations, distraction and cognitive change (but not acceptance) are strongly correlated. Additionally, we also found that trait self-control is very strongly correlated with behavioral inhibition. However, whereas some strategies have a moderate correlation with trait self-control (i.e., pre-commitment, distraction, and cognitive change), other strategies have a very small (situation selection, acceptance) or non-existent (reward and punishment) correlation, suggesting that the current measure of trait self-control does not adequately reflect all of the strategies people use when pursuing their long-term goals.

As indicated in Table 5, we also examined the extent to which the different self-control strategies predicted trait self-control. As expected, inhibition was not the only strategy associated with higher levels of trait self-control, as pre-commitment was also positively associated with greater levels of trait self-control, whereas punishment and acceptance were associated with lower levels of trait self-control.

Testing the predictive validity of the SCSS across domains

Across three samples (Samples 2a-2c), we tested the predictive validity of the SCSS across a variety of domains, including self-control failure in a variety of domains, savings, weight-related outcomes (BMI, distance from ideal weight), and physical activity (gym membership and attendance, sports, exercise). Descriptive statistics and correlations between the self-control strategies, trait self-control, and all outcome variables are presented in Table 6. The BSCS and the behavioral inhibition strategy have the highest and most consistent correlation pattern compared to other strategies.

Strategies predicting domain-specific outcomes

Using multiple regression analyses, we examined the extent to which the eight different strategies predict each domain-specific outcome (see Table 7). Where applicable, the interactions between each strategy and goal importance were entered to the regression model[4]. Overall, the results suggest that different strategies may be more applicable within certain domains, but not others. Specifically, we found that inhibition and pre-commitment were negatively associated with self-control failure more generally (i.e., when assessing self-control failure in self-selected domains). Surprisingly, we also found that punishment and cognitive change were positively associated with greater self-control failure, suggesting that these strategies may have a maladaptive influence on self-control. With respect to savings, pre-commitment was positively associated with contributing to a greater number of savings account programs (e.g., general savings, retirement, etc.). For weight-related outcomes, we found that cognitive change and behavioral inhibition were negatively associated with BMI, whereas acceptance and behavioral inhibition were negatively associated with distance from a person's ideal weight. Together, these findings suggest that these strategies in particular may have a positive impact on weight control. Finally, we found that pre-commitment was a consistent predictor for physical exercise, as it was positively associated with having a gym membership, gym attendance, and engaging in sport activities. Behavioral inhibition was also positively associated with engaging in sport activities and exercising.

Interactions between strategies and goal importance

In addition to the different self-control strategies, results further indicate that goal importance consistently predicted positive outcomes across all applicable domains, including savings, having a gym membership, gym attendance, engaging in sport activities, and exercise (see Table 7). For savings, there was a significant interaction between goal importance and distraction, $B = 0.19$, $SE = 0.06$, $t = 2.89$, $p = .004$, 95% CI [0.06, 0.32], such that distraction was negatively associated with savings, but only for those who did not find their savings goal to be important (i.e., those low in goal importance), $B = -0.20$, $SD = 0.08$, $t = -2.60$, $p = .010$, CI [-0.35, −0.05]. For those who reported savings as being important, distraction was not associated with savings, and if anything, showed a positive non-significant trend, $B = 0.10$, $SD = 0.08$, $t = 1.22$, $p = .222$, CI [-0.06, 0.25].

With respect to physical activities, there was a significant interaction between goal importance and reward in

Table 4. Means, standard deviations, and correlations among the Brief Self-Control Scale (BSCS) and the Self-Control Strategies Scale (SCSS) across all samples (n = 1,946).

	1	2	3	4	5	6	7	8	9
1. BSCS	–								
2. Situation selection	.28 [.24,.32]	–							
3. Reward	.03 [-.02,.07]	.18 [.13,.22]	–						
4. Punishment	.11 [.07,.15]	.35 [.31,.38]	.40 [.36,.44]	–					
5. Pre-commitment	.40 [.35,.44]	.48 [.44,.51]	.36 [.32,.40]	.50 [.47,.53]	–				
6. Distraction	.38 [.33,.42]	.60 [.57,.63]	.19 [.13,.23]	.25 [.21,.31]	.45 [.41,.49]	–			
7. Cognitive change	.40 [.35,.44]	.51 [.47,.55]	.18 [.13,.23]	.31 [.26,.35]	.44 [.40,.48]	.63 [.59,.68]	–		
8. Acceptance	-.18 [-.23,-.12]	-.14 [-.18,-.09]	.11 [.06,.15]	-.10 [-.15,-.05]	-.09 [-.14,-.05]	-.14 [-.19,-.09]	.00 [-.05,.05]	–	
9. Behavioral inhibition	.80 [.78,.82]	.26 [.21,.30]	-.01 [-.06,.04]	.11 [.06,.15]	.34 [.30,.38]	.40 [.35,.44]	.45 [.40,.48]	-.19 [-.24,-.14]	–
Mean	3.32	3.16	3.60	2.63	3.24	3.50	3.18	3.23	3.22
SD	0.82	0.55	1.02	0.94	0.80	0.88	0.87	0.81	0.92

Note. Correlations larger than .044 are significant at $p < .05$. 95% CI is reported in [].

Table 5. Regression coefficients from multiple regression analysis predicting trait self-control scores from specific self-control strategies (n = 1,946).

	β	*B*	SE	*t*	*p*	95% CI
Sample 1c	−.03	−0.10	0.05	−2.23	.026	[−0.20, −0.01]
Sample 2a	.00	0.01	0.03	0.28	.782	[−0.06, 0.07]
Sample 2 b	.04	0.08	0.03	2.41	.016	[0.01, 0.14]
Sample 2c	.00	0.00	0.03	−0.10	.922	[−0.06, 0.06]
Situation selection	.03	0.02	0.02	1.49	.135	[−0.01, 0.05]
Reward	.00	0.00	0.01	−0.02	.981	[−0.02, 0.02]
Punishment	−.06	**−0.05**	**0.01**	**−3.83**	**<.001**	**[−0.08, −0.03]**
Pre-commitment	.16	**0.16**	**0.02**	**8.88**	**<.001**	**[0.13, 0.20]**
Distraction	.00	0.00	0.02	0.25	.802	[−0.03, 0.04]
Cognitive change	.00	0.00	0.02	0.13	.899	[−0.03, 0.04]
Acceptance	−.03	**−0.03**	**0.01**	**−2.02**	**.043**	**[−0.06, 0.00]**
Behavioral inhibition	.73	**0.65**	**0.01**	**46.40**	**<.001**	**[0.62, 0.68]**

Notes. Sample (coded 1 b, 1c, 2a-2c) was entered as a dummy variable in the analysis (Sample 1 b served as reference). $N = 1{,}946$, $R^2 = .66$. Including sample as a predictor controlled for any differences in self-control failure across sample.

predicting gym attendance, $B = -0.07$, $SE = 0.03$, $t = 6.48$, $p = .030$, 95% CI [-0.13, −0.01], such that using rewards was negatively associated with gym attendance, but only for those who find being physically active an important goal, $B = -0.10$, $SD = 0.05$, $t = -2.13$, $p = .033$, CI [-0.20, −0.01]. For those who reported being physically active as less important, reward had no influence over gym attendance, $B = 0.01$, $SD = 0.05$, $t = 0.29$, $p = .771$, CI [-0.08, 0.10]. This suggests that reward is not a strategy that supports gym attendance, especially for those who find it important to be physically active. For engagement in sport activities, there were significant interactions between goal importance and pre-commitment, $B = 0.08$, $SE = 0.03$, $t = 2.42$, $p = .016$, 95% CI [0.01, 0.15], cognitive change, $B = -0.07$, $SE = 0.03$, $t = -2.16$, $p = .032$, 95% CI [-0.13, −0.01], and inhibition, $B = 0.07$, $SE = 0.02$, $t = 2.95$, $p = .003$, 95% CI [0.02, 0.12], such that these strategies had no impact on engagement in sport activities for people who did not find this goal to be important (pre-commitment: $B = -0.01$, $SD = 0.05$, $t = -0.24$, $p = .808$, CI [-0.11, 0.08], cognitive change: $B = 0.03$, $SD = 0.05$, $t = 0.53$, $p = .597$, CI [-0.11, 0.08], inhibition: $B = -0.02$, $SD = 0.04$, $t = -0.50$, $p = .615$, CI [-0.01, 0.06]). For people who found this goal to be more important, both pre-commitment, $B = 0.19$, $SD = 0.06$, $t = 2.99$, $p = .003$, CI [0.06, 0.31], and inhibition, $B = 0.16$, $SD = 0.05$, $t = 3.46$, $p < .001$, CI [0.07, 0.25], was associated with greater engagement in sport activities, whereas cognitive change was associated with less engagement, $B = -0.14$, $SD = 0.06$, $t = -2.45$, $p = .015$, CI [-0.25, −0.03]. Goal importance did not interact with any of the strategies for gym membership or exercise.

Incremental validity

Our findings show that the BSCS is most strongly associated with behavioral inhibition, suggesting that research focusing on self-control as captured by the BSCS likely focuses mostly on one particular strategy. Although our goal was to study self-control strategies, it is possible that people only use this one strategy that is reflected in the BSCS, and thus our scale does not provide novel aspects of self-control. We took two measures to assure that our scale adds value over and above

Table 6. Means, standard deviations, and correlations between the Brief Self-Control Scale (BSCS), the Self-Control Strategies Scale (SCSS), and all dependent variables for Samples 2a-c.

	M	*SD*	*n*	BSCS	Situation selection	Reward	Punishment	Pre-commitment	Distraction	Cognitive change	Acceptance	Behavioral inhibition
Self-control failure composite (-)	1.91	0.78	1373	-.46 [-.49,-.42]	-.05 [-.1,0]	.01 [-.03,.06]	.09 [.04,.13]	-.13 [-.17,-.07]	-.14 [-.19,-.1]	-.11 [-.16,-.05]	.09 [.04,.14]	-.39 [-.44,-.35]
Gym membership (+)	.22	.41	965	.02 [-.04,.08]	.07 [.02,.13]	.08 [.03,.13]	.11 [.05,.16]	.14 [.07,.20]	.02 [-.04,.07]	.01 [-.04,.07]	-.02 [-.07,.04]	.04 [-.01,.10]
Gym attendance (+)	2.38	2.10	627	.11 [.05,.17]	.10 [.04,.17]	.01 [-.07,.09]	.15 [.08,.23]	.19 [.11,.26]	.11 [.04,.17]	.08 [.01,.16]	-.04 [-.11,.02]	.12 [.06,.18]
Sports (+)	2.26	1.81	416	.17 [.08,.28]	.14 [.08,.22]	.10 [.01,.19]	.2 [.10,.28]	.21 [.14,.30]	.09 [0,.18]	.12 [.03,.21]	-.05 [-.14,.03]	.15 [.07,.25]
Exercise (+)	4.21	2.22	549	.26 [.18,.34]	.14 [.07,.21]	.04 [-.04,.13]	.08 [-.01,.16]	.19 [.12,.27]	.21 [.13,.29]	.21 [.14,.30]	-.01 [-.07,.07]	.25 [.19,.33]
Savings (+)	0.99	0.82	549	.20 [.1,.28]	.11 [.01,.18]	.14 [.07,.21]	.12 [.04,.20]	.27 [.18,.35]	.08 [-.02,.15]	.07 [-.02,.14]	.02 [-.07,.10]	.1 [.01,.18]
BMI (-)	27.52	7.13	1369	-.03 [-.08,.02]	.05 [-.01,.11]	.00 [-.05,.07]	-.07 [-.12,-.01]	-.06 [-.11,-.02]	-.15 [-.20,-.10]	.01 [-.04,.07]	-.26 [-.32,-.22]	-.25 [-.30,-.20]
Distance from ideal weight (-)	71.30	17.94	777	-.27 [-.32,-.20]	-.02 [-.07,.04]	.03 [-.03,.08]	.00 [-.06,.05]	-.08 [-.14,-.02]	-.04 [-.10,.03]	-.17 [-.22,-.11]	.01 [-.05,.07]	-.28 [-.33,-.22]
Item inter-correlation				.66		.69	.48	.29	.65	.54	.47	.61

Notes. Expected direction (+,-) of correlation that is in line with high self-control is in parentheses next to a dependent variable. Significance level of $p < .05$ is reached when $r > .053$, $r > .063$, $r > .070$, $r > .084$, $r > .096$, for 1373, 1369, 965, 627, 549, 416, participants, respectively.
For gym membership, M and SD refer to proportion of people that reporting having such a membership.

the ability captured by the BSCS. We used hierarchical regression to examine whether the *Adjusted-R^2* significantly increases in all of the DVs when the SCSS is added to a model that includes only BSCS. As Figure 4 illustrates, *Adjusted-R^2* significantly increases in 9 out of the 11 analyses (and only numerically increases in the remaining two). We further ran a set of SEM analyses, in which we compared between a model that included only the SCSS to three other models (one that included only the BSCS, one that included both the BSCS and the SCSS, and one that replaced our inhibition subscale with the BSCS). We find that the model that includes only the SCSS has the best model fit in predicting self-control related outcomes, and this is robust across outcomes (see Figure 4).

Discussion

The main goal of the present research was to develop and validate the SCSS. Moving beyond the traditional focus on inhibition, the SCSS incorporates more recent theoretical perspectives of self-control that focus on a wider array of self-control strategies, some of which are more preventive and others more interventive (e.g., Fujita, 2011; Hofmann & Kotabe, 2012). Integrating both anticipatory control (situation/stimulus modification, reward, punishment, and pre-commitment), down-regulation of temptation (distraction, reappraisal, and acceptance), as well as the classical strategy of behavioral inhibition into a single measure enabled us to capture a broader scope of the theoretical construct of self-control. The different subscales of self-control included in our scale represent different strategies for self-control that are interrelated, suggesting that self-control is more than mere behavioral inhibition, as advocated by a variety of recent conceptualizations of the construct (Duckworth et al., 2016; Fujita, 2011; Gillebaart & de Ridder, 2015; Hofmann & Kotabe, 2012).

A first important insight from this program of research indicates that the BSCS mainly captures behavioral inhibition. Quite reassuringly, multiple regression analyses sending the strategies proposed by the SCSS into a "horse race" for predictive validity showed that behavioral inhibition was a key predictor for most domain-specific outcomes. This gives credibility to findings from the past 15 years of self-control research, which has relied on the BSCS as the gold standard for self-control. The outcome of this horse race suggests that researchers who wish to incorporate an economical measure for trait self-control in their studies can safely bet on the BSCS or the Behavioral Inhibition subscale of the SCSS, knowing that these scales capture a large portion of the construct of self-control. These findings stand in some contrast to the process model of self-control (Duckworth et al., 2014; Duckworth et al., 2016), which suggests that earlier strategies (e.g., situation selection, situation modification) are generally more effective than strategies that are used to cope with temptations more directly (the least effective being inhibition). Nonetheless, while the remaining strategies in our scale only rarely out-predicted behavioral inhibition, it can be used to gain a more fine-

Table 7. Regression coefficients from multiple regression analyses predicting gym membership, gym attendance, sports engagement, and exercise from specific self-control strategies.

	Self-Control Failure						Savings					
	β	*B*	*SE*	*t*	*p*	95% CI	*β*	*B*	*SE*	*t*	*p*	95% CI
1.slc	0.03	0.01	0.01	1.21	0.228	[−0.01, 0.04]	0.03	0.03	0.05	0.54	0.59	[−0.07, 0.12]
2.rwrd	0.00	−0.01	0.01	−1.32	0.188	[−0.03, 0.01]	0.06	0.05	0.04	1.28	0.20	[−0.03, 0.12]
3.pnish	**−0.06**	**0.05**	**0.01**	**4.82**	**<.001**	**[0.03, 0.07]**	−0.01	−0.01	0.04	−0.18	0.86	[−0.09, 0.08]
4.prc	**0.16**	**−0.04**	**0.01**	**−3.03**	**0.002**	**[−0.07, −0.01]**	**0.26**	**0.28**	**0.06**	**4.88**	**<.001**	**[0.17, 0.39]**
5.distr	0.00	−0.02	0.01	−1.24	0.214	[−0.04, 0.01]	−0.05	−0.05	0.06	−0.86	0.39	[−0.17, 0.06]
6.cog	**0.00**	**0.03**	**0.01**	**2.23**	**0.026**	**[0.00, 0.06]**	−0.07	−0.07	0.06	−1.23	0.22	[−0.18, 0.04]
7.accpt	−0.03	0.01	0.01	0.89	0.372	[−0.01, 0.03]	0.04	0.04	0.05	0.80	0.43	[−0.05, 0.12]
8.inhib	**0.73**	**−0.17**	**0.01**	**−15.63**	**<.001**	**[−0.19, −0.15]**	0.06	0.05	0.04	1.17	0.24	[−0.03, 0.14]
9.impr	–	–	–	–	–	–	**0.18**	**0.19**	**0.05**	**4.12**	**<.001**	**[0.10, 0.28]**
	BMI						**Distance from Ideal Weight**					
	β	*B*	SE	*t*	*p*	95% CI	*β*	*B*	SE	*t*	*p*	95% CI
1.slc	0.05	0.01	0.01	1.29	0.20	[−0.01, 0.03]	0.02	0.33	0.85	0.39	0.70	[−1.35, 2.00]
2.rwrd	0.05	0.01	0.01	1.61	0.11	[0.00, 0.02]	0.03	0.56	0.69	0.82	0.41	[−0.78, 1.91]
3.pnish	−0.01	0.00	0.01	−0.18	0.86	[−0.02, 0.01]	0.03	0.61	0.81	0.76	0.45	[−0.97, 2.19]
4.prc	0.00	0.00	0.01	−0.12	0.91	[−0.02, 0.02]	−0.01	−0.19	1.02	−0.19	0.85	[−2.19, 1.81]
5.distr	*0.07*	*0.02*	*0.01*	*1.74*	0.08	[0.00, 0.04]	0.07	1.40	1.04	1.35	0.18	[−0.64, 3.45]
6.cog	**−0.10**	**−0.03**	**0.01**	**−2.62**	**0.01**	**[−0.05, −0.01]**	*−0.08*	*−1.73*	*0.99*	*−1.74*	*0.08*	[−3.68, 0.22]
7.accpt	−0.02	−0.01	0.01	−0.87	0.39	[−0.02, 0.01]	**−0.07**	**−1.58**	**0.80**	**−1.98**	**0.05**	**[−3.15, −0.01]**
8.inhib	**−0.26**	**−0.07**	**0.01**	**−8.37**	**<.001**	**[−0.08, −0.05]**	**−0.30**	**−5.91**	**0.82**	**−7.24**	**<.001**	**[−7.51, −4.31]**
9.impr	–	–	–	–	–	–	–	–	–	–	–	–
	Gym Membership						**Gym Attendance**					
	β	*B*	*SE*	*t*	*p*	95% CI	*β*	*B*	*SE*	*t*	*p*	95% CI
1.slc	0.34	0.14	0.13	1.14	0.26	[−0.10, 0.39]	0.00	0.00	0.04	−0.08	0.94	[−0.08, 0.07]
2.rwrd	0.11	0.04	0.10	0.42	0.68	[−0.16, 0.24]	*−0.07*	*−0.06*	*0.03*	*−1.77*	0.08	*[−0.12, 0.01]*
3.pnish	0.13	0.06	0.12	0.48	0.63	[−0.17, 0.28]	0.06	0.04	0.03	1.29	0.20	[−0.02, 0.11]
4.prc	**0.65**	**0.33**	**0.15**	**2.23**	**0.03**	**[0.04, 0.62]**	*0.09*	*0.09*	*0.05*	*1.94*	0.05	*[0.00, 0.18]*
5.distr	−0.34	−0.16	0.15	−1.08	0.28	[−0.45, 0.13]	0.00	0.00	0.05	0.05	0.96	[−0.09, 0.09]
6.cog	*−0.53*	*−0.25*	*0.14*	*−1.77*	*0.08*	[−0.53, 0.03]	−0.02	−0.02	0.04	−0.34	0.73	[−0.10, 0.07]
7.accpt	0.02	0.01	0.12	0.09	0.93	[−0.22, 0.24]	0.00	0.00	0.04	0.03	0.98	[−0.07, 0.07]
8.inhib	0.26	0.12	0.11	1.01	0.31	[−0.11, 0.34]	*0.07*	*0.06*	*0.03*	*1.68*	*0.09*	*[−0.01, 0.13]*
9.impr	**1.78**	**0.57**	**0.09**	**6.49**	**<.001**	**[0.40, 0.74]**	**0.24**	**0.19**	**0.03**	**6.48**	**<.001**	**[0.13, 0.24]**
	Sports						**Exercise**					
	β	*B*	SE	*t*	*p*	95% CI	*β*	*B*	SE	*t*	*p*	95% CI
1.slc	−0.04	−0.02	0.03	−0.78	0.44	[−0.09, 0.04]	−0.04	−0.08	0.11	−0.74	0.46	[−0.31, 0.14]
2.rwrd	−0.03	−0.02	0.03	−0.88	0.38	[−0.07, 0.03]	−0.05	−0.10	0.09	−1.09	0.28	[−0.29, 0.08]
3.pnish	0.03	0.02	0.03	0.77	0.44	[−0.04, 0.08]	−0.02	−0.05	0.11	−0.45	0.66	[−0.26, 0.16]
4.prc	**0.11**	**0.09**	**0.04**	**2.27**	0.02	**[0.01, 0.16]**	0.06	0.17	0.14	1.21	0.23	[−0.1, 0.44]
5.distr	0.00	0.00	0.04	−0.02	0.99	[−0.07, 0.07]	0.06	0.16	0.14	1.14	0.25	[−0.12, 0.44]
6.cog	−0.07	−0.06	0.04	−1.50	0.13	[−0.13, 0.02]	0.02	0.05	0.14	0.36	0.72	[−0.22, 0.32]
7.accpt	−0.01	−0.01	0.03	−0.43	0.67	[−0.07, 0.04]	0.03	0.09	0.11	0.82	0.41	[−0.13, 0.32]
8.inhib	**0.09**	**0.07**	**0.03**	**2.28**	0.02	[0.01, 0.13]	**0.20**	**0.46**	**0.11**	**4.40**	**<.001**	**[0.26, 0.67]**
9.impr	**0.72**	**0.40**	**0.02**	**21.30**	**<.001**	**[0.36, 0.44]**	**0.43**	**1.06**	**0.09**	**11.22**	**<.001**	**[0.87, 1.24]**

Notes. Number of predictors was 9, for self-control failure, BMI, distance from ideal weight, which included the subscales and Sample, 18 for gym membership, and gym attendance, which included also importance, and 17, for Sports, exercise, and savings, which did not included sample, and. $n = 1{,}373$, $R^2 = .23$, for Self-Control Failure, $n = 549$, $R^2 = .13$ for Savings, $n = 1{,}369$, $R^2 = .08$ for BMI, $n = 777$, $R^2 = .10$ for Distance from Ideal Weight, $n = 965$, *McFadden* $R^2 = .08$ for Gym membership, $n = 627$, $R^2 = .26$ for Gym attendance, $n = 416$, $R^2 = .59$ for Sports, and $n = 549$, $R^2 = .28$ for Exercise. Self-control failure, BMI, Sports, and Gym membership were positively skewed (skewness coefficients = 1.81, 1.55, 1.43, 1.19, respectively), we log transformed all regressions involving these variables. 1.slc = situation selection, 2.rwrd = reward, 3.pnish = punishment, 4.prc = pre-commitment, 5.distr = distraction, 6.cog = cognitive change, 7.accpt = acceptance, 8.inhib = inhibition, 9.impr = importance.

grained understanding on how people regulate themselves in order to achieve their goals.

Support for the notion that studying self-control may benefit from a measure of self-control strategies comes from our findings that reward, a strategy that can be used either internally (when the reward is provided by the individual) or externally (when the reward is provided by another person), is not captured by the BSCS. This strategy was reported as the most broadly used strategy by our participants (as opposed to punishment, which was reported to be the least used, see Table 4), thus emphasizing that it is important to inspect the role applying reward as a strategy plays in a variety of life domains. Although incentivizing people by introducing a future reward is beneficial in enhancing a desired behavior (e.g., Locke & Latham, 2002; Mischel, 1974; Muraven & Slessareva, 2003), research on reward reactivity suggests that exposure to rewards or their representations enhances craving for the reward (for reviews see Boswell & Kober, 2016; Gass et al., 2014), thus impairing self-regulation (Wagner, 2017). The presence of rewards directs a limited cognitive resource (Kemps et al., 2008), as well as thoughts (e.g., Hofmann & Van Dillen, 2012) to the reward, and reduces inhibition (Katzir et al., 2010), thus impairing task performance. Using a strategy that involves maintaining an active mental representation of a future reward (i.e., the reward that is dependent on attainment of

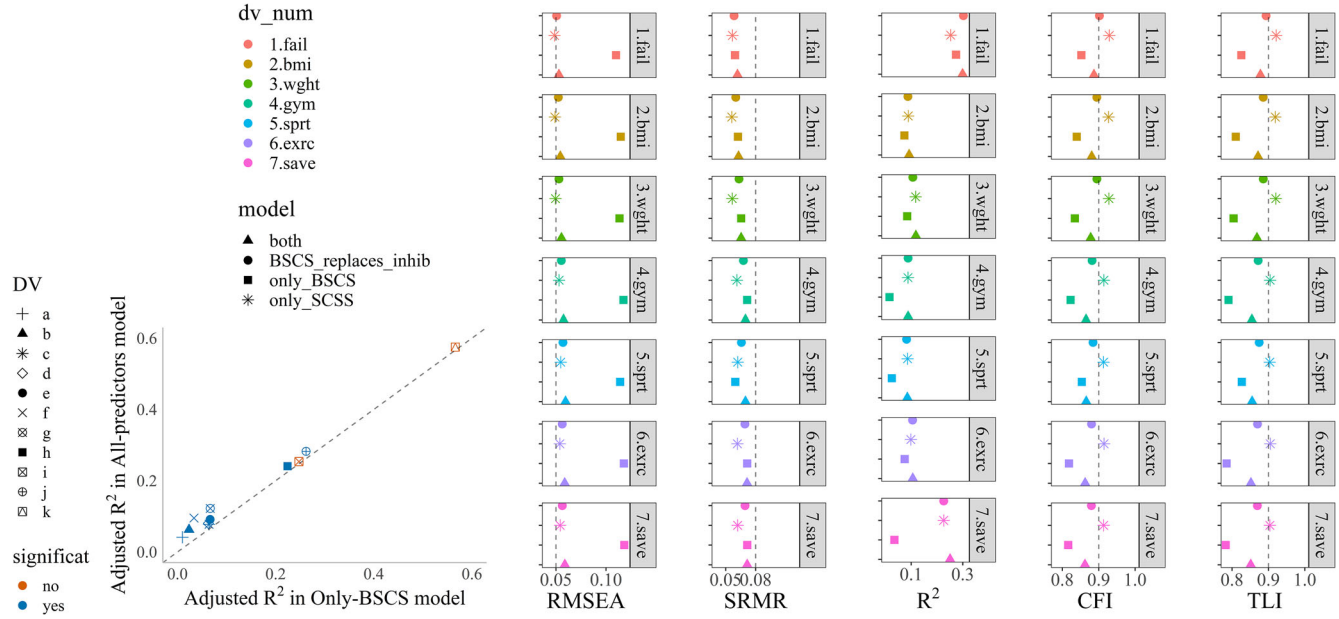

Figure 4. Incremental validity. Left bottom: Adjusted-R^2 increase, significant increase in blue, non-significant increase in orange. a = gym attendance (excluding importance and its interactions), b = sports (excluding importance and its interactions), c = exercise (excluding importance and its interactions), d = BMI, e = distance from ideal weight, f = savings (excluding importance and its interactions), g = savings, h = gym attendance, i = exercise, j = self-control failure, k = sports. Right: Fit indices of the four SEM models when predicting, from top to bottom: savings, exercise, sports, gym attendance, ideal weight, BMI, failure at most important domain, and overall self-control failure. A model that includes the BSCS and the SCSS (both) is represented by a triangle, a model that includes only the BSCS (Only_BSCS) is represented by a circle. A model that includes only the SCSS (Only SCSS) is represented by a square. A model that includes replaces the inhibition subscale with the BSCS (BSCS_replaces_inhib) is represented by an asterisk.

the focal goal) may obscure self-control. Thus, rewards may be harmful for self-control especially if a temptation is used as the future reward. Future research may benefit from inspecting when this strategy is efficient and whether on some occasions it backfires (as seems to be the case, e.g., by the trends in exercise and self-control failure we obtained in our investigation).

Another advantage that emerges from the SCSS is its potential to uncover domain-specific effects or to allow for a better understanding of fit between strategy and problem context (i.e., not all strategies might be equally beneficial for a given self-control problem) or fit between person and strategy (i.e., not everyone may benefit from the same strategy to the same extent), to name just a few applications. While limited in scope, one of the few empirical tests of the effectiveness of these more nuanced self-control strategies found that being trained to use situation modification helped students make greater progress on their academic goals compared to students who were trained to use inhibition or no strategy at all (Duckworth et al., 2016). In the study conducted by de Vet et al. (2014), they found that all strategies (e.g., avoidance of temptations (akin to situation selection), controlling temptations (akin to situation modification), suppression, rule setting, distraction) were all positively correlated with fruit and vegetable intake, and negatively correlated with snack intake. Thus, while situation selection may be effective in the pursuit of academic goals and having any strategy may be relevant for healthy eating, our findings further suggest that the effectiveness of the different strategies may vary across domains. For example, in the present study we found that cognitive change was associated with maladaptive outcomes related to physical activity and savings, yet had a positive impact on BMI and distance from ideal weight, and, interestingly, also had the highest positive impact on failure in the food domain compared to other specific domains (See SOM in OSF). This suggests a potential benefit from cognitive reappraisal in the food domain, but not in other domains. Similarly, pre-commitment had no impact on weight-related outcomes, but had a positive impact on most other outcomes. The domain specific influences await more meticulous research.

An important implication emanating from these domain-specific advantages and detriments demonstrated by our findings suggests that interventions designed to enhance self-control should be domain-specific. Thus, interventions should not only teach people a wide variety of strategies, but most importantly when to apply them in the appropriate contexts. For example, interventions that are designed to help people in being more physically active or saving money may benefit from enhancing pre-commitment (e.g., teaching how to apply this strategy in these given contexts), whereas interventions that are designed to help people in monitoring their weight will benefit from incorporating cognitive change.

Self-control interventions may especially benefit from a line of work focused on strategies rather than ability, as training the ability is limited and yields small to no effects (Friese et al., 2017; Sala & Gobet, 2019). Using the scale may further shed light on whether people who exhibit self-control failures are bad at identifying beneficial strategies for specific domains or are bad at implementing the strategies they correctly identified.

Nevertheless, our work focused on self-control as resistance to temptation. Yet, self-control may also be required

for initiating activities or persisting on activities that may be aversive or boring (de Boer et al., 2011; de Ridder et al., 2011). Although we believe that even initiating activities and persistence may be conceptualized as resisting the temptation to do nothing or to rest, respectively, we acknowledge that much more research is needed to further understand the role of the strategies mentioned here, and potential other strategies, for other forms of self-control. For example, some forms of anticipated control (e.g., reward), may be more motivating, and therefore supporting to initiatory control, than others (e.g., punishment)[5].

We reasoned that the self-control strategies will be beneficial only when people hold the goal to obtain the outcome, as theories and conceptualizations of self-control and motivation suggest or imply, given that lacking a goal will render the use of any self-control strategy unnecessary (e.g., Atkinson, 1954; Kruglanski et al., 2002; Locke & Latham, 2002; Richter et al., 2016). Interestingly, we find that goal importance was a strong and consistent predictor of goal attainment. On the rare occasion that this predictor interacted with a strategy, it mainly either served as buffer against the detrimental influence this strategy had for those who did not find the goal to be important (as in the case of distraction and savings) or improved the outcome when the goal was indeed important (as in the case of pre-commitment and behavioral inhibition in sports). This puts goal importance as one of the leading players in self-control, suggesting that interventions aimed at improving self-control should focus to a large extent on enhancing goal importance. Indeed, enhancing goal importance (e.g., via monetary incentives, motivational speaking, self-efficacy) was shown to enhance effort to attain goals as well as performance on a variety of tasks (for overviews see Locke & Latham, 2002; Richter et al., 2016). Yet, amplifying goal importance should be done cautiously so as to avoid the negative outcomes associated with failing to attain important goals (Moberly & Watkins, 2010).

As we mentioned above, the BSCS was a reliable predictor of most of the self-control outcomes (see Table 6 and SOM) and was mainly predicted by behavioral inhibition. The findings that behavioral inhibition overpowers other strategies was also rather consistent. This may suggest that, in line with previous self-control conceptualizations, behavioral inhibition is (one of) the building blocks of self-control (Barkley, 2001; Baumeister et al., 1994; Hofmann et al., 2012; Tangney et al., 2004), as evident by research connecting deficits in inhibition to deficits in self-control (e.g., Nederkoorn et al., 2010; Payne, 2005). This would suggest that people do not have much power over their ability. Nonetheless, the BSCS seems to reflect people's general sense of being "good" or "bad" at self-control, as reflected by items such as "I am lazy", "I am good at resisting temptation". It could therefore be that the strong association between the BSCS and the behavioral inhibition subscale from the SCSS may also reflect that behavioral inhibition is the construct that people identify most as self-control (especially because the items in the behavioral inhibition subscale also took the form of success and failure at resistance to temptations "When I face a temptation there is a high likelihood I will resist it", "It is hard for me to control my behavior when I experience unwanted desires"). Either way, given that the behavioral inhibition subscale examines success/failure at *inhibition* rather than an overall self-control failure as reflected in the BSCS, the strong association between these two scales that examine a different construct calls for a more systematic comparison.

Nevertheless, the strong link between the BSCS and the behavioral inhibition subscale may point to the potential benefit and contribution of the SCSS. Whereas much of the research on individual differences in self-control focused on measuring people's tendency to succeed or fail at self-control, very little work has captured the specific strategies people use in order to control themselves. Understanding these strategies may help explain why some people, under some circumstances, or in some domains, are more likely to have self-control success or failure.

Based on prior theorizing and the vast literature on the positive outcomes associated with acceptance, at least in the realm of emotion regulation (Baer, 2006; Braams et al., 2012), we were quite surprised that acceptance was negatively associated with the BSCS, all other strategies, and most outcomes (with the exception of distance from ideal weight). It is possible that our acceptance items do not appropriately capture acceptance and are interpreted by participants as giving in to temptation. It is also possible, however, that people do not benefit from acceptance because using it may lead to a cycle of self-control failure by normalizing such failure (De Witt Huberts et al., 2012; Prinsen et al., 2018). The nature of the relation between acceptance and self-control awaits future research.

Limitations

Although we collected 6 samples, five of them, which comprised 93% of the aggregated sample, were a rather homogenous sample of US participants (MTurkers). Another shortcoming is that we only used self-report measures to assess self-control related outcomes. Future research would benefit from studying more heterogenous samples, across cultures, and from using behavioral measures.

Another potential shortcoming of the current investigation is that by explaining essential terms associated with self-control participants read that "the following questionnaire is designed to measure your self-control". Given that self-control is considered a desired outcome, not including impression management scales prevents us from assessing the influence self-presentation may had on answering the SCSS. Yet, including such scales has been advised against (Paulhus & Vazire, 2007). Furthermore, our findings indicate that despite potential self-presentations, not all strategies are beneficial in all contexts, and it is thus possible that these effects are underestimated. Future research would benefit from asking about strategies more indirectly, or by highlighting to participants detrimental effects associated with self-control (e.g., rigidity). Another, perhaps better approach would be to use behavioral measures (e.g.,

observing how people organize their situation, or how often they reward themselves).

Finally, the correlations between subscales may obscure some interesting insights about strategies that researchers could create specific predictions about. For example, inhibition may overshadow detrimental or beneficial influence of some strategies. Thus, on the one hand, the data suggest that the SCSS does not add an extreme amount of predictive power over the BSCS, yet, to study particular strategies, researchers will benefit from using the SCSS. Although we have not studied specific hypotheses and specific strategies, we believe that the SCSS can be used as a first step in an exploratory analysis and based on the obtained correlations researchers can decide which strategies are worth further exploration.

Conclusion

We present a reliable questionnaire that broadens the construct of self-control to include current conceptualizations of self-control, shifting the focus from self-control ability to self-control strategies. We find that the BSCS is a good predictor of most of the self-control related outcomes examined in this sample, and that it seems to mainly reflect behavioral inhibition. This suggests that behavioral inhibition is either the building block of self-control or the construct lay people mostly associated with it. Nevertheless, other strategies from our broader scale contributed to the prediction of some self-control related outcomes above and beyond behavioral inhibition, thus showing that future research on self-control can benefit from incorporating this broader scale. Importantly, we find that people make use of many different strategies, although they do not always lead to positive outcomes, thus calling for careful application of self-control strategies and matching them to the domains where they are beneficial.

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Disclosure statement

No potential conflict of interest was reported by the authors.

Note

1. We opted for an EFA, instead of Exploratory SEM, to enable flexibility in case the data deviate from our pre-registered theoretical model, as it slightly did (see Table 1). A parallel analysis indicated 7 factors (see SOM for scree plot), and Eigenvalues indicated 10 factors. The model that made most theoretical sense was based on the 10-factor model, see SOM for loadings.
2. Because only three items loaded above the pre-registered cut-off (i.e., 0.40) on pre-commitment, we decided to select all the five items originally phrased as examining pre-commitment to allow for enough items to examine this facet in Sample 1b. Results of the CFA in Sample 1b indicated that one of the pre-commitment items had a loading below 0.40 and was therefore removed, leaving 38 items in the final SCSS. The low reliability of the final pre-commitment subscale presumably reflects a theoretically driven constructs with different aspects that do not highly correlate, yet future research should improve this subscale. Reports of the CFA refer to the 38-item scale. The final scale in Figure 3 includes very slight modifications in the phrasing of some items due to grammatical errors or an attempt to make them more general.
3. Please note that measuring savings with number of savings is limited as a person could invest a lot of money into only one savings account, or could be limited by debt, family wealth and other factors.
4. For brevity and ease of presentation, Table 7 includes only the results concerning strategies, which are the most relevant variables. Full Tables can be found in SOM, where Sample as well as all the interactions are presented.
5. For initial support of this claim and the full analysis of initiatory and inhibitory control see SOM.
6. We excluded 31 additional participants who did not answer "definitely use my answers" to an item asking them whether their data should be excluded from analysis.

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Data availability statement

The data that support the findings of this study are openly available in Open Science Framework (OSF) at https://osf.io/hpaxy/?view_only=0119fd67e4974da99cd0b3a8f40576a7. Five out of the six studies were pre-registered (links: Study 1a; Study 1 b; Study 2a; Study 2 b; Study 2c).

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