



# When more is less: Self-control strategies are seen as less indicative of self-control than just willpower<sup>☆</sup>

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## ABSTRACT

People may suppress temptations with pure willpower or use strategies to reduce their pull. In this paper, we examine lay theories about self-control strategy use. A fictional person described as a high self-control individual was seen as more likely to use willpower than strategies (Experiment 1). In four other experiments, targets described as using strategies were perceived as relatively lower in self-control than those using willpower (Experiments 2–5). This difference disappeared for participants who scored high on a scale assessing the belief that strategies are indicative of self-control (Experiment 4) and was reduced for those who were assigned to read an article about self-control strategies rather than about willpower (Experiment 5). Strategy beliefs were also linked to more intentions to use strategies (Experiments 4–5). We conclude that willpower is more central to people's idea of self-control than strategies, and that this lay belief affects person perception and behavioral intentions.

People encounter temptations frequently in their lives. From tempting food when trying to eat healthy, to tempting distractions at work and tempting sales offers when saving, people have to regulate their responses. There are many ways to make goal-orientated rather than temptation-oriented decisions. Imagine Jamie who sets up his life in a way that makes temptations less likely – he takes the long way to work to avoid the tempting candy shop, turns off his phone to prevent distractions at work, and has set up rewards and penalties for himself to regulate his spending. In contrast, Alex uses pure willpower to suppress these temptations and act in line with her goals. Regardless of their success at self-regulation, will Jamie or Alex be seen as having better self-control? In the present experiments we examine lay beliefs about the use of self-control strategies as more or less indicative of self-control, as well as consequences of this belief.

## 1. Willpower and strategies

Several decades of research examined willpower as the capacity to suppress tempting impulses, equalizing self-control with willpower (Baumeister & Heatherton, 1996; Hofmann, Friese, & Strack, 2009). In other words, people with higher trait self-control were seen as being better at suppressing temptations through the use of their willpower, an effortful and potentially depleting process (Baumeister, Vohs, & Tice,

2007). Plenty of evidence has shown that willpower can indeed help people exert self-control and achieve their goals (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012; Mischel, Shoda, & Rodriguez, 1989; Tangney, Baumeister, & Boone, 2004). However, recent theories of self-control have shifted to go beyond willpower to include strategies – the actions and thoughts people take to design their environment in a way that make goal-directed choices easier and more likely (Duckworth, Milkman, & Laibson, 2018; Fujita, Orvell, & Kross, 2020; Gillebaart & de Ridder, 2015; Hennecke & Bürgler, 2020). Some strategies might be employed to avoid or change a self-regulation situation (situational strategies), and some might be employed to direct attention or thoughts during the situation (intrapyschic strategies), (Duckworth, Gendler, & Gross, 2014; Duckworth, White, Matteucci, Shearer, & Gross, 2016; Gross, 2015). For example, a person with the goal to lose weight who is facing a temptation such as delicious cookies might put the cookies out of reach (i.e., modifying the situation) or might think of ways to make the cookie less appealing, such as calling to mind their weight goal or pretending the cookie is plastic (i.e., intrapsychic strategies). Arguably, employing self-control strategies is less effortful than applying strength of will, and could be a more sustainable way to self-control (e.g., see research on 'nudges', Leonard, Thaler, & Sunstein, 2008; also see Duckworth, Taxer, Eskreis-Winkler, Galla, & Gross, 2019; Hennecke & Bürgler, 2020; Inzlicht, Werner, Briskin, &

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Roberts, 2021 for reviews). People high in trait self-control do tend to use more strategies such as avoiding temptations (Ent, Baumeister, & Tice, 2015), choosing a less distracting work environment (Ent et al., 2015; Leduc-Cummings, Werner, Milyavskaya, Dominick, & Cole, 2022), and forming more implementation intentions (Werner, Sjästad, Milyavskaya, & Hofmann, 2020) than people low in trait self-control. In sum, the current empirical literature supports the view of self-control strategy use as being characteristic of individuals high in self-control.

## 2. Lay beliefs about self-control strategies

Do lay individuals' beliefs about self-control strategies match the current science? In the present paper we examine lay beliefs about whether using self-control strategies is seen as indicative of good or poor self-control. On the one hand, people might recognize the self-control value of strategies. Many people report regularly using strategies in their daily life when these strategies are described and they are prompted to indicate use (e.g., Hennecke, Czikmantor, & Brandstätter, 2019; Milyavskaya, Saunders, & Inzlicht, 2021), although this number is much lower when strategies are freely recalled rather than selected (Milyavskaya & Nadolny, 2018). The experience of successful self-control through strategy use might shape beliefs about these actions and thoughts, and people might recognize the link between strategy use and high self-control. On the other hand, people might regard strategy use as a crutch, something needed only when true willpower is not sufficient. Indeed, a qualitative study on smoking cessation (Smith, Carter, Chapman, Dunlop, & Freeman, 2015) reported that former smokers believed that seeking assistance from practitioners or support groups would be seen as a sign of weakness compared to choosing to quit 'cold turkey' (i.e., relying on their willpower to quit). Behavior modification programs addressing self-control problems such as gambling (Griffiths, Wood, & Parke, 2009) or psychotherapy (Gulliver, Griffiths, & Christensen, 2010) have been shown to be stigmatized as being only relevant to those who "need it" or those low on innate self-control. Thus, it is also possible that lay people perceive the use of self-control strategies as indicative of low self-control.

There are few studies that have examined beliefs about self-control strategies directly. In a set of studies comparing the perceived implications of using different types of self-control strategies, Bermúdez, Murray, Chartrand, and Barbosa (2021) found that a fictional student was rated as better on self-control and related concepts when she suppressed the impulse on willpower alone and when she used reappraisal (i.e., an intrapsychic strategy) than when she distracted herself or used situation modification to stick to her studying goal. This study suggests that lay theories about self-control strategies might link some strategy use to relatively worse self-control.

Another set of studies examined the folk concept of self-control while pitching two types of control against each other (Irving, Bridges, Glasser, Bermúdez, & Sripada, 2022): using willpower to resist temptation in the moment (labelled synchronic regulation) versus using willpower to resist anticipated, future temptation (labelled diachronic regulation). Across a variety of temptation scenarios, Irving and colleagues found that participants used primarily information about immediate willpower use when making self-control judgments. For example, someone using willpower to give away a tasty food to a roommate instead of eating it for their own lunch today was rated as higher in self-control than someone using willpower to give away the food instead of saving it for their own lunch tomorrow. Thus, these studies also suggested that lay theories about self-control strategies might link some strategy use (e.g., diachronic regulation for delayed temptation) to relatively poorer self-control.

## 3. Why do lay beliefs matter?

Implicit theories can have powerful effects on cognition and behavior. For example, beliefs about whether abilities are fixed or

malleable can affect reactions to failure (Dweck & Leggett, 1988; Mueller & Dweck, 1998) such as bouncing back after dieting setbacks (Burnette & Finkel, 2012). Similarly, beliefs about whether willpower is a limited resource that is depleted after exertion or not can affect one's ability to employ successful self-control (Francis & Job, 2018; Job, Dweck, & Walton, 2010). For instance, students who held non-limited theories of willpower in the weeks before final exams ate fewer unhealthy foods, experienced less procrastination, and made greater progress in their achievement goals relative to students who held limited theories of willpower (Job et al., 2010, Study 4). In a similar way, lay beliefs about strategy use as part of self-control may be directly related to a person's willingness to use strategies – if Jamie believes that using strategies is indicative of good self-control, he should be more willing to use those strategies himself, compared to Alex, who believes that using strategies reflects poor self-control. Indeed, views of strategy use as indicative of poor self-control might represent a barrier to successful self-control. Smokers who are more resistant to using strategies other than willpower to quit smoking due to perceiving these strategies a weakness (Smith et al., 2015) miss out on some of the tools of self-control.

Lay beliefs about whether strategy use is indicative of good or poor self-control might also affect how people judge those they see using strategies. People with high self-control tend to be viewed by others as more likeable, trustworthy, and reliable (Peetz & Kammrath, 2011; Righetti & Finkenauer, 2011; Röseler, Ebert, Schütz, & Baumeister, 2021). For example, persons high in self-control are better liked and preferred as a dating partner (Röseler et al., 2021; Shea, Davisson, & Fitzsimons, 2013). If the use of everyday self-control strategies such as placing the alarm on the other side of the room to get out of bed in the morning, paying into a swear-jar to reduce foul language, or rewarding oneself after finishing an important work deadline is linked to other's perception of one's self-control, this can have important social consequences. If Alex believes that using such strategies implies poorer self-control, he might be less willing to befriend Jamie, who manages her life via multiple self-control strategies. Indeed, existing research already suggests that people might perceive fictional individuals using commitment-based self-control strategies as less trustworthy than individuals depicted as using willpower only (Kristal & Zlatev, 2021). Specifically, participants expressed reluctance to use a commitment self-control strategy (a commitment contract website, a web blocker app, or a lock box) if the decision to use this strategy would be made public rather than kept private (Kristal & Zlatev, 2021). According to the authors, the findings suggest that people may be aware of the negative social consequences of using commitment strategies and are thus hesitant to do so. In sum, lay beliefs about whether self-control strategies are indicative of relatively better or worse self-control may affect person perception.

## 4. Overview of the present experiments

Across five experiments, we examined participants' lay beliefs about self-control strategy use and perceived trait self-control. A first experiment tested whether someone described as having high self-control would be seen as more or less likely to use strategies (Experiment 1), three experiments tested whether a person described as using strategies versus described as using pure willpower to control temptations would be judged as relatively lower or higher in trait self-control (Experiment 2–4), and two experiments tested the role of strategy beliefs as a predictor of participants' own intentions to use strategies, both when assessed as self-report (Experiment 4) and when manipulated experimentally (Experiment 5). Using a newly designed scale to assess explicit lay beliefs of strategy use and willpower (Experiments 4 and 5), we hypothesize that lay beliefs link the use of self-control strategies with relatively poorer self-control than the use of willpower. We further hypothesize that the stronger this belief (that willpower is more indicative of self-control than strategies), the less self-control someone might

ascribe to someone else using self-control strategies and the less likely they are to intend to use strategies themselves.

These experiments expand on existing research by examining lay beliefs about self-control strategies. Regardless of the actual benefits of strategies for goal-oriented behavior, people's beliefs about what using strategies means might affect how they perceive others who use strategies and their own intentions to use strategies. The present experiments test lay beliefs about strategies and willpower in general terms, rather than comparing beliefs about specific types of strategies (cf. Bermúdez et al., 2021; Irving et al., 2022).

Participants for all experiments were recruited through crowd-sourced samples. Several precautions were taken to ensure data quality: participants had passed Cloudresearch's or Prolific Academic's validity checks, were from U.S. and Canada only, completed a reCAPTCHA box, and completed an open-ended attention check. Sample size was determined before any data analysis. Samples are described in Table 1. In these experiments, we report all measures, manipulations, and exclusions. Full materials, data and syntax for all experiments are available on OSF: <https://osf.io/6ezsk/>.

## 5. Experiment 1

This initial experiment examined whether people might ascribe different types of self-regulation behaviors to individuals who are high or low in self-control. Would a high self-control individual be seen as more likely to use willpower to suppress temptations, and less likely to use strategies to reduce temptations or distract the self from temptations, than a low self-control individual? This experiment was not preregistered.

### 5.1. Method

After reporting demographic information, participants were presented with the descriptions of a person high in self-control ("This is A. A

is very good at resisting temptations. He refuses to do things that are bad for him and is very good at working towards long-term goals. People say he has iron self-discipline, because he never says inappropriate things and thinks through all the alternatives before acting.") and a person low in self-control ("This is B. B often gives in to temptations. He does things that are bad for him if they are fun, and pleasure and fun sometimes keep him from getting work done. People say he lacks self-discipline, because he often has trouble concentrating and can't stop himself from doing something even if he knows it's wrong."). The hypothetical persons in the vignette were gender-matched to the participant, with the one non-binary participant reading about two female persons. Descriptions were based on the items of the Trait Self-Control Scale (Tangney et al., 2004).

Participants were then asked, "Who do you think is more likely to do each behavior?" and sorted 20 behaviors into a box labelled "A" or a box labelled "B." Of these behaviors, five items were describing the exertion of willpower (e.g., "controls themselves by sheer willpower when faced with a temptation."), five items were describing strategy use (e.g., "takes detour rather than walking by a tempting store."), and ten items were distractor items (e.g., "likes to draw bird watercolor pictures."). We calculated the percentage of the behaviors ascribed to each person that were strategy items and the percentage of the behaviors ascribed that were willpower items.

### 5.2. Results and discussion

Paired-test comparisons showed that participants thought the person described as having high self-control would be more likely to use willpower (90% attributed to A, 10% attributed to B,  $t(100) = 17.46, p < .001, d = 1.74$ ) and more likely to use self-control strategies (83% attributed to A, 17% attributed to B,  $t(100) = 12.71, p < .001, d = 1.26$ ) than the person described as having low self-control. However, participants did also think that a low-self-control person would be more likely to use strategies than willpower (17% vs 10%,  $t(100) = 2.48, p = .015, d = 0.25$ ). This analysis had 80% power to detect an effect size of  $d = 0.25$ .

**Table 1**

Participant descriptives across experiments.

	Design	Recruitment	% exclusions	Final N	Mean age in years (SD), range	Gender	Ethnicity
Experiment 1	2 within-subject (high vs low self-control)	Cloudresearch/MTurk	13%	100	36.46 (8.97) 23–66	31% women 68% men 1% nonbinary or n/a	76.5% White; 9.6% Black 10.4% Asian; 3.5% Hispanic; 1.7% Indigenous; 0.9% Middle Eastern
Experiment 2*	2 within-subject (willpower vs strategies) × 5 within-subject (vignettes)	Cloudresearch/MTurk	1%	199	44.81 (12.94) 20–77	47.7% women 50.8% men 1.5% nonbinary or n/a	76.4% White; 7.5% Black 6.5% Asian; 5.5% Hispanic; 0.5% Indigenous; 2% Multiracial or Mixed; 1.5% Other
Experiment 3*	3 between-subject (willpower vs. strategies vs. control)	Cloudresearch/MTurk	6%	267	40.60 (11.51) 19–74	47.2% women 52.8% men	80.9% White; 12.7% Black; 4.5% Asian; 4.5% Hispanic; 0.7% Indigenous; 0.4% Middle Eastern
Experiment 4*	Continuous (beliefs scale) × 3 between-subject (willpower vs. strategies vs. control) × 2 between-subject (order)	Cloudresearch/MTurk	1%	443	42.30 (13.08) 19–74	54.4% women 44.5% men 1.1% nonbinary or n/a	80.1% White; 9.7% Black 7.4% Asian; 6.1% Hispanic; 2.5% Indigenous; 0.5% Middle Eastern 0.4% Other
Pilot	2 between-subject (beliefs conditions)	Prolific Academic	3%	98	27.31 (7.88) 18–52	56.3% women 41.7% men 2.1% nonbinary or n/a	51% White; 14% Black 2% Asian; 24.5% Hispanic; 1% Multiracial or Mixed; 5% Other
Experiment 5*	2 between-subject (beliefs conditions)	Prolific Academic	0%	270	36.37 (13.26) 18–81	66.8% women 29.9% men 2.9% nonbinary or n/a	77.9% White; 3.3% Black 11.1% Asian; 2.6% Hispanic; 3.7% Multiracial or Mixed, 1.1% Other

Note. \* Preregistered. Compensation at US\$6.5 hourly rate for Cloudresearch and US\$7.1 hourly rate for Prolific Academic. Exclusions were based on an open-ended attention check that read "Explain your reasoning" after the main dependent variable. Average word count of participants' open-ended responses was 24 (Experiment 1), 31 (Experiment 2), 25 (Experiment 3), 28 (Experiment 4), and 25 (Experiment 5), respectively.

In sum, high self-control individuals are seen as both using their willpower and strategies more than a low self-control individual.

### 6. Experiment 2

In the next experiment, we examined the reverse inference: What do people infer from learning that a person has used strategies (vs willpower) to self-regulate impulses? In this experiment, participants read about two hypothetical persons, one who used willpower and one who used a strategy to regulate the same impulse. We expected that participants would rate those who use willpower to overcome temptations as higher in self-control relative to those who use self-control strategies. This hypothesis, the data collection plan, design, and analyses were preregistered: <https://aspredicted.org/zp8vn.pdf>.

#### 6.1. Method

After reporting demographic information, participants were presented with five different vignettes depicting a self-control conflict (e.g., “G and E each have to complete a project for work but find themselves scrolling through social media instead of working on the project.”). These five vignettes corresponded to five different types of strategies (situation modification, cognitive change, reward, punishment, and inhibition) and each described a different type of temptation conflict (social media, gym attendance, junk food, alcohol, savings). They were then told about two hypothetical people, one who used willpower (e.g., “G decides to use pure willpower to avoid social media.”) and one who used a self-control strategy (e.g., “E decides to block all social media apps on their devices to avoid social media.”). Participants then rated each person in the scenario as high or low in self-control (“Do you think G/E is HIGH or LOW in self-control?”) on a 7-point scale (1 = *Very low in self-control*, 7 = *Very high in self-control*). Finally, participants also completed exploratory measures of potentially relevant traits (see online supplements for exploratory analyses: <https://osf.io/9m84j>).

#### 6.2. Results and discussion

In a multilevel regression model in which responses were nested within participants we examined self-control ratings across the five vignettes simultaneously while accounting for within-participant variance (preregistered). This analysis had 91.26% power to detect an effect size of  $b = 0.2$ . This power analysis was based on a Monte Carlo simulation ( $\alpha = 0.05$ ,  $n_{sim} = 5000$ ) using the *simr* package in R. The intra-class correlation (ICC) supported the use of a multilevel analysis (ICC = 0.18), indicating that approximately 18% of the variance in self-control ratings could be attributed to the between-person level and approximately 82% of the variance existed at the within-person level. In the multilevel regression model, we regressed self-control ratings on strategy use (person used willpower, person used self-control strategy) while controlling vignette (social media, gym attendance, junk food, alcohol, savings). Strategy use significantly predicted self-control ratings,  $b = -1.86$ ,  $se = 0.06$ , 95%CI[-1.98;-1.75],  $t(1786) = -30.64$ ,  $p < .001$ . As expected, participants rated persons using willpower to overcome temptation as higher in self-control ( $M = 5.77$ ,  $SD = 0.62$ ) than persons using strategies ( $M = 3.91$ ,  $SD = 0.62$ ). See online supplements for all coefficients by vignette: <https://osf.io/9m84j>.

In sum, participants rated targets who were described as using strategies when faced with temptation as lower in self-control than targets who use willpower. In this experiment both fictional persons - the willpower user and strategy user - were presented together but rated on separate scales. That is, they are contrasted without being forced into opposite ends of the spectrum. In the next experiment, we examine whether the same effect occurs when participants read about only one person who is described as either using willpower or strategies (i.e., a between-subject design where the other option is not made explicit) or neither (i.e., a control condition).

### 7. Experiment 3

In this experiment we examined people’s perception of a person after learning this person has used willpower or strategies to counter tempting impulses in a between-subject design. We expected that both a person using strategies and a person using willpower would be rated as higher in self-control than a person who uses neither, but that someone using strategies to counter temptations would be seen as lower in self-control than someone using only strength of will. This hypothesis, the data collection plan, design, and analyses were preregistered: <https://aspredicted.org/x87h6.pdf>.

#### 7.1. Method

After reporting demographic information, participants were randomly assigned to read about a person who experienced three self-control dilemmas (eating healthy, focusing at work, saving for a trip) with no further information (control condition), with a description of successful self-control via suppressing temptations and exerting pure willpower (willpower condition), or with a description of successful self-control via strategies (strategies condition). For example, participants in the control condition read “B has the goal to eat healthy, but on his way to work there is a cookie shop that he loves.” Participants in the strategies condition read “B has the goal to eat healthy, but on his way to work there is a cookie shop that he loves. Everyday he takes the long way home from work to avoid the store. (...) B uses self-control strategies to avoid giving in to temptation.”. Participants in the willpower condition read “B has the goal to eat healthy, but on his way to work there is a cookie shop that he loves. Everyday he suppresses the impulse to go into the store. (...) B uses strength of will to avoid giving in to temptation.”. The vignettes were gender matched to the participant.

Participants were then asked to rate the hypothetical person “B” on a 13-item trait self-control scale (e.g., “B is good at resisting temptation.”; adapted from Tangney et al., 2004) which were answered on scales from *Not at all like B* (1) to *Very much like B* (5) and were averaged into a perceived self-control scale ( $\alpha = 0.94$ ). Finally, participants reported the frequency with which they themselves experience temptations, use willpower, and use strategies on a scale from *Never* (1) to *All the time* (5).

#### 7.2. Results and discussion

A one-way ANOVA showed a significant effect of condition,  $F(2, 264) = 83.09$ ,  $p < .001$ ,  $\eta^2 = 0.39$  (preregistered). This analysis had 80% power to detect an effect size of  $f = 0.19$ . Means are presented in Table 2.

**Table 2**  
Person perception means across experiments.

		Control condition		Person using willpower		Person using strategies	
		M	SD	M	SD	M	SD
Experiment 2	Single item self-control judgment	–	–	5.77	0.62	3.91	0.62
				a		b	
Experiment 3	Trait self-control	3.24	0.67	4.46	0.57	4.14	0.73
		a		b		c	
Experiment 4	Single item self-control judgment	4.62	1.16	6.56	0.69	6.07	1.09
		a		b		c	
	Trait self-control	3.47	0.68	4.30	0.51	3.97	0.67
		a		b		c	
Experiment 5	Single item self-control judgment	–	–	5.64 <sub>a</sub>	1.26	4.04 <sub>b</sub>	1.44

Note. Single item self-control judgment on a seven-point scale, trait self-control on a five-point scale. Experiment 2 aggregates across five vignettes. Experiment 5 aggregates across three vignettes. Means significantly different from each other within one row are marked by different subscripts.

Follow-up contrasts showed that participants rated a person as higher in self-control if they read about that person using strategies than if they read the control scenario,  $F(1, 264) = 81.95, p < .001, \eta_p^2 = 0.237$ . Participants also rated a person as higher in self-control if they read about that person using willpower than if they read the control scenario,  $F(1, 264) = 157.46, p < .001, \eta_p^2 = 0.374$ . Finally, participants rated the person using willpower as higher in self-control than the person using strategies,  $F(1, 264) = 10.57, p = .001, \eta_p^2 = 0.038$ .

In exploratory (not preregistered) analyses we also examined participants' own self-reported frequency of willpower and strategy use. Participants reported using willpower to suppress tempting impulses more often ( $M = 3.69, SD = 0.72$ ) than strategies ( $M = 3.55, SD = 0.81$ ),  $t(266) = 3.16, p = .002, d = 0.19$ . Controlling for participants' own self-control behaviors did not reduce the significance of the condition effect: In an ANOVA where participants' own willpower use and strategy use were entered as covariates, the condition continued to have a significant effect on perceived self-control of the hypothetical person,  $F(2, 262) = 81.92, p < .001$ , and neither covariate significantly predicted perceived self-control (willpower use:  $F(1, 161) = 0.05, p = .816$ ; strategy use:  $F(1, 262) = 0.32, p = .570$ ).

In sum, both strategy and willpower use boosted the perception of the target as higher in self-control compared to a target described as encountering temptations without information on how these temptations were countered. However, people who were described as using strategies when faced with temptation were rated as lower in self-control than people who were described as using willpower, suggesting that strategy use is relatively less central to people's lay beliefs about what constitutes self-control than willpower. In the next experiment we examine participants' explicit endorsement of beliefs about strategy use.

## 8. Experiment 4

In this experiment we had two aims: First, we designed a scale assessing the explicit endorsement of beliefs about strategies being more or less indicative of self-control, testing whether scores on this scale were meaningfully linked to inferences participants drew about persons described as using strategies or willpower. Second, we examined participants' own intentions to use self-control strategies in the next week. We expected that those who endorse the belief that self-control strategies are less indicative of self-control would rate a hypothetical person using strategies as lower in self-control than a person using willpower and would be less likely to intend to use strategies themselves. These hypotheses, the data collection plan, design, and analyses were preregistered: <https://aspredicted.org/vu3s7.pdf>

### 8.1. Method

Participants reported demographic information, and then completed the strategy beliefs scale and the person perception task described in Experiment 3, in counterbalanced order. We tested for order effects (preregistered), but order of the measures did not affect any of the measures in this experiment,  $t_s < 0.1.27, p_s > 0.205$ , was not a significant covariate in the analyses reported below, and was not further considered.

The strategy beliefs scale included six items, three of which were statements about strategies indicating high self-control (e.g., "If someone made a habit of using strategies, I would be confident in their ability to control themselves.") and three about strategies indicating low self-

control (e.g., "A person who avoids temptations to make it easier on themselves is weak-willed.") which were reverse coded.<sup>1</sup> The full scale is available in Appendix A. The items were internally coherent (Cronbach's alpha = 0.83), and a principal component analysis showed that all items loaded on one factor (54.61% variance explained, Eigenvalue 3.28), with all item factor loadings  $> 0.62$ . Items were averaged into an index of strategy beliefs. The distribution of this index was moderately negatively skewed,  $Skewness = -0.65, se = 0.12$ , with the mode ( $M_o = 4.00$ ) being slightly above the mean of the distribution ( $M = 3.96, SD = 0.70$ ).

In the person perception task, participants read about a gender-matched person (he, she, or them, respectively) who experienced self-control dilemmas with no further information (control condition), with a description of successful self-control via suppressing temptations (willpower condition), or with a description of successful self-control via strategies (strategies condition), as in Experiment 3. Participants then rated the hypothetical person "B" on a single item indicating low or high self-control on a 7-point Likert scale ( $M = 5.77, SD = 1.29$ ), and on a 13-item trait self-control scale on a 5-point Likert scale ( $M = 3.93, SD = 0.71$ ).

Finally, all participants reported on their own intended strategy use in the next week. First, they rated the general frequency of intended strategy use ("How often will you use strategies in a typical day in the next week?" *never, rarely, sometimes, often, all the time*,  $M = 3.13, SD = 0.94$ ). Second, they rated the likelihood of seven different types of strategy use in the next week (e.g., situation selection, punishment, reward, pre-commitment, distraction, cognitive change, and acceptance; items adapted from Katzir, Baldwin, Werner, & Hofmann, 2021, e.g., "I will seek out situations in my life where I will not face temptation (e.g., by avoiding tempting situations)") on scales ranging from *Not at all likely I will do this* (1) to *Extremely likely I will do this* (5). The seven items assessing intended specific strategy use were averaged (Cronbach's alpha = 0.75,  $M = 2.84, SD = 0.75$ ). Participants also rated willpower use ("I will simply keep myself from acting on unwanted desires (e.g., I use willpower)") on the same scale ( $M = 3.32, SD = 1.14$ ).

### 8.2. Results

#### 8.2.1. Person perception

First, we examined whether the effect of condition found in Experiment 3 replicated (not preregistered). A one-way ANOVA showed a significant effect of condition on both the single item rating of self-control,  $F(2, 440) = 152.21, p < .001, \eta^2 = 0.41$ , and perceived trait self-control,  $F(2, 437) = 65.89, p < .001, \eta^2 = 0.23$ . This analysis had 80% power to detect an effect size of  $f = 0.15$ . Means are presented in Table 2. Follow-up contrasts for the single item rating of self-control showed that participants rated a person as higher in self-control if they read about that person using willpower than if they read the control scenario,  $F(1, 440) = 285.05, p < .001, \eta_p^2 = 0.393$ , and as higher in self-control if they read about that person using strategies than if they read the control scenario,  $F(1, 440) = 154.29, p < .001, \eta_p^2 = 0.260$ . Participants rated the person using strategies as lower in self-control than the person using willpower,  $F(1, 440) = 18.68, p < .001, \eta_p^2 = 0.041$ . Follow-up contrasts for the trait scale of self-control showed the same pattern: participants rated a person as higher in trait self-control if they read about that person using willpower than if they read the control scenario,  $F(1, 437) = 130.68, p < .001, \eta_p^2 = 0.230$ , and if they read about that person using strategies than if they read the control scenario,  $F(1, 437)$

<sup>1</sup> One of these items might have represented strategies as inferior trick method "If someone has to trick themselves into keeping their goals, that would mean they lack self-control." (reverse coded). This item was based on Schelling's (1978) definition of self-management but may bias responses. We also conducted all analyses reported here with a shorter version of the scale without this item. All results replicated (see online supplements: <https://osf.io/9m84j>).

= 46.02,  $p < .001$ ,  $\eta_p^2 = 0.095$ . Participants rated the person using strategies as lower in trait self-control than the person using willpower,  $F(1, 437) = 20.98$ ,  $p < .001$ ,  $\eta_p^2 = 0.046$ . Thus, findings replicated.

Next, we examined whether the difference between condition was moderated by the strategy beliefs scale (preregistered). In multiple regressions using PROCESS (Hayes, 2018, v3.2. Model 1, 5000 bootstrap samples, 95%CI), we entered the beliefs scale, condition (-1 = strategy condition, 0 = control condition, 1 = willpower condition), and the effect coded interaction terms (Control vs Strategy conditions; Strategy vs Willpower conditions) as predictors, and the single item measure and the trait scale assessing perceived self-control, as outcome variables, respectively. These analyses had 80% power to detect an effect size of  $f^2 = 0.04$ . For the single self-control item, the beliefs scale main effect was significant,  $b = 0.52$ ,  $se = 0.06$ ,  $t(437) = 8.36$ ,  $p < .001$ , the Control vs Strategy main effect was significant,  $b = -1.12$ ,  $se = 0.06$ ,  $t(437) = -18.11$ ,  $p < .001$ , the Strategy vs Willpower main effect was significant,  $b = 0.81$ ,  $se = 0.06$ ,  $t(437) = 13.49$ ,  $p < .001$ . The beliefs  $\times$  Control vs Strategy interaction term was not significant,  $b = -0.12$ ,  $se = 0.09$ ,  $t(437) = -1.28$ ,  $p = .200$ , and the beliefs  $\times$  Strategy vs Willpower interaction was significant,  $b = -0.22$ ,  $se = 0.09$ ,  $t(437) = -2.64$ ,  $p = .009$  (Fig. 1). Among people who believe that strategies are not indicative of self-control (1 SD below the mean on the beliefs scale), the person using willpower was perceived as higher in self-control than the person using strategies,  $b = 0.98$ ,  $se = 0.09$ ,  $t(437) = 11.46$ ,  $p < .001$ , and the person in the control condition was seen as lower in self-control than the person using strategies,  $b = -1.04$ ,  $se = 0.09$ ,  $t(437) = -11.80$ ,  $p < .001$ . Among people who strongly believe that strategies are indicative of self-control (1 SD above the mean on the beliefs scale), the person in the control condition was still seen as lower in self-control than the person

using strategies,  $b = -1.20$ ,  $se = 0.09$ ,  $t(437) = -13.35$ ,  $p < .001$ , and the person using willpower was still perceived as higher in self-control than the person using strategies,  $b = 0.66$ ,  $se = 0.09$ ,  $t(437) = 7.75$ ,  $p < .001$ , but this difference was not as pronounced, as indicated by the significant interaction term and as shown in Fig. 1. Note that when only the contrast comparing strategy and willpower conditions was included in the interaction analysis, the beliefs  $\times$  Strategy vs Willpower interaction term was also significant,  $b = 0.56$ ,  $se = 0.13$ ,  $t(296) = 4.48$ ,  $p < .001$ , and those high in strategy beliefs perceived the person using strategies as similarly high in self-control as the person using willpower,  $b = -0.10$ ,  $se = 0.13$ ,  $t(296) = -0.78$ ,  $p = .435$ .

For the trait self-control scale, the beliefs scale main effect was significant,  $b = 0.30$ ,  $se = 0.04$ ,  $t(434) = 7.47$ ,  $p < .001$ , the Control vs Strategy main effect was significant,  $b = -0.44$ ,  $se = 0.04$ ,  $t(434) = -11.03$ ,  $p < .001$ , the Strategy vs Willpower main effect was significant,  $b = 0.39$ ,  $se = 0.04$ ,  $t(434) = 10.08$ ,  $p < .001$ . The beliefs  $\times$  Control vs Strategy interaction term was marginally significant,  $b = -0.11$ ,  $se = 0.06$ ,  $t(434) = -1.87$ ,  $p = .063$ , and the beliefs  $\times$  Strategy vs Willpower interaction was not significant,  $b = -0.09$ ,  $se = 0.05$ ,  $t(434) = -1.60$ ,  $p = .110$  (Fig. 1). Among people who believe that strategies are not indicative of self-control (1 SD below the mean on the beliefs scale), the person in the control condition was seen as lower in self-control than the person using strategies,  $b = -0.36$ ,  $se = 0.06$ ,  $t(434) = -6.38$ ,  $p < .001$ , and this difference was more pronounced among people who strongly believe that strategies are indicative of self-control (1 SD above the mean on the beliefs scale),  $b = -0.51$ ,  $se = 0.06$ ,  $t(434) = -8.92$ ,  $p < .001$ .

Note that when only the strategy and willpower condition contrast was included in the interaction analysis, the beliefs  $\times$  Strategy vs

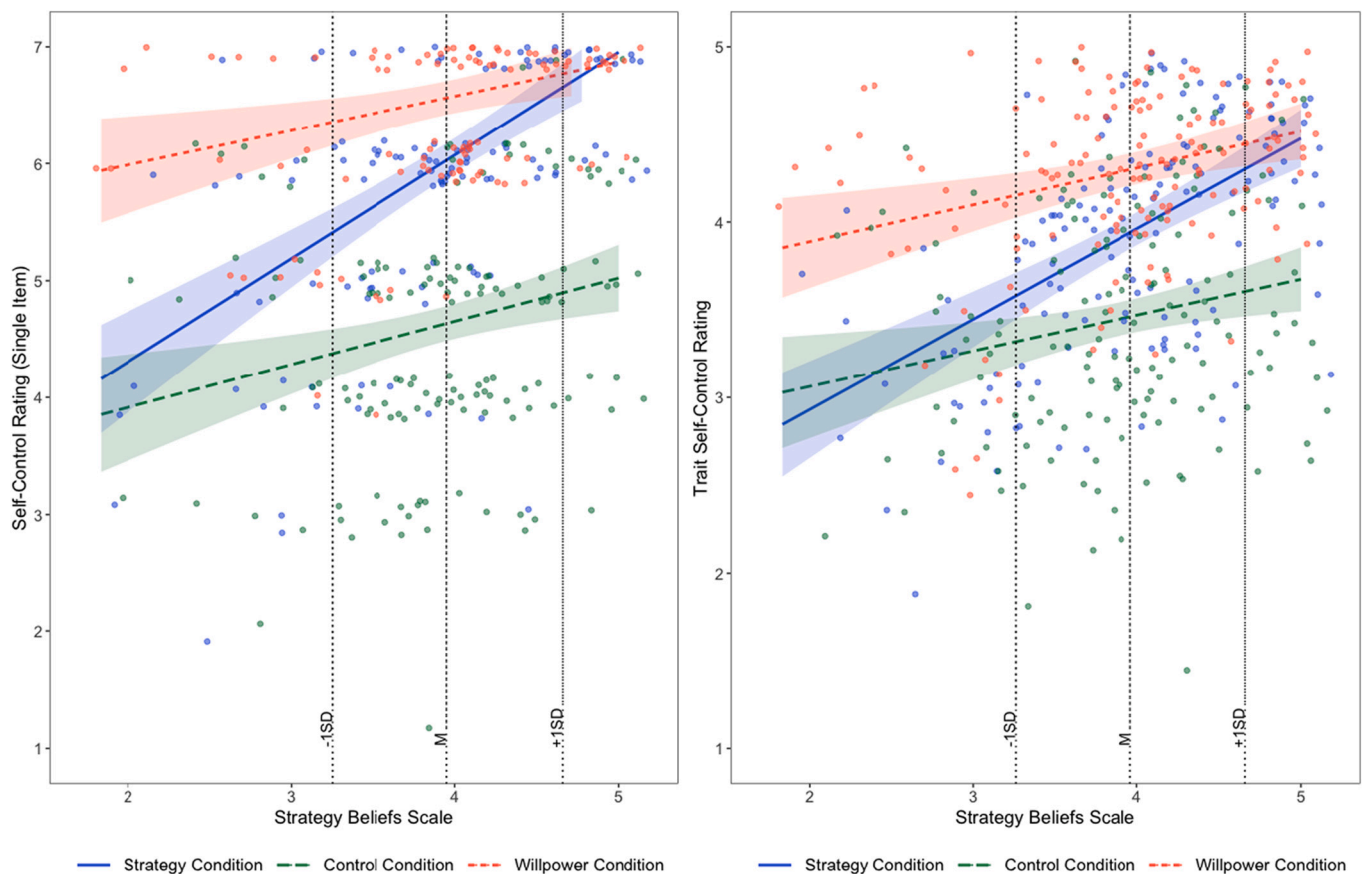


Fig. 1. Perceived self-control of the fictional person by person condition and strategy beliefs scale. Note. Ribbons represent 95% confidence intervals. Dashed vertical lines mark the values representing -1SD (left line), mean (middle line), and +1SD (right line) on the strategy beliefs scale.

Willpower interaction term was significant,  $b = -0.28$ ,  $se = 0.09$ ,  $t(295) = 3.31$ ,  $p = .001$ , and those high in strategy beliefs did not perceive the person using strategies as significantly lower in self-control than the person using willpower anymore,  $b = -0.14$ ,  $se = 0.09$ ,  $t(295) = -1.56$ ,  $p = .118$ .

8.2.2. Strategy use intention

First, we examined the correlations between beliefs and intentions (not preregistered). Participants who more strongly endorsed beliefs about strategies being indicative of self-control intended to use strategies more frequently in the next week,  $r(440) = 0.34$ ,  $p < .001$ , and expected that it would be more likely that they would use the seven specific strategies,  $r(440) = 0.33$ ,  $p < .001$ , and less likely that they would simply suppress temptations/use willpower,  $r(440) = -0.10$ ,  $p = .042$ .

In multiple regressions using PROCESS (Hayes, 2018, v3.2. Model 1, 5000 bootstrap samples, 95%CI), we entered the beliefs scale, condition (-1 = strategy condition, 0 = control condition, 1 = willpower condition), and their interaction term as predictors, and the likelihood of specific strategy use scale as outcome variable (preregistered). These analyses had 80% power to detect an effect size of  $f^2 = 0.04$ . The beliefs scale main effect was significant,  $b = 0.35$ ,  $se = 0.05$ ,  $t(437) = 7.19$ ,  $p < .001$ , the Control vs Strategy main effect was not significant,  $b = -0.03$ ,  $se = 0.05$ ,  $t(437) = -0.58$ ,  $p = .565$ , the Strategy vs Willpower main effect was not significant,  $b = -0.01$ ,  $se = 0.05$ ,  $t(437) = -0.14$ ,  $p = .888$ . The beliefs  $\times$  Control vs Strategy interaction term was not significant,  $b = -0.05$ ,  $se = 0.07$ ,  $t(437) = -0.71$ ,  $p = .481$ , and the beliefs  $\times$  Strategy vs Willpower interaction was not significant,  $b = 0.06$ ,  $se = 0.07$ ,  $t(437) = 0.96$ ,  $p = .337$ . In other words, the more participants believed that strategy use was indicative of self-control, the more likely they

judged it that they would use self-control strategies themselves in the next week, regardless of the person perception condition (Fig. 2).

The same analysis with the single item assessing general strategy use intentions as dependent variable (not preregistered) replicated results: The beliefs scale main effect was significant,  $b = 0.45$ ,  $se = 0.06$ ,  $t(436) = 7.42$ ,  $p < .001$ , the Control vs Strategy main effect was not significant,  $b = -0.01$ ,  $se = 0.06$ ,  $t(436) = -0.17$ ,  $p = .861$ , and the Strategy vs Willpower main effect was not significant,  $b = -0.03$ ,  $se = 0.06$ ,  $t(436) = -0.55$ ,  $p = .584$ . The beliefs  $\times$  Control vs Strategy interaction term was not significant,  $b = 0.02$ ,  $se = 0.09$ ,  $t(436) = 0.18$ ,  $p = .859$ , and the beliefs  $\times$  Strategy vs Willpower interaction was not significant,  $b = -0.01$ ,  $se = 0.08$ ,  $t(436) = 0.09$ ,  $p = .930$  (Fig. 2).

8.3. Discussion

We replicated earlier results showing that a target who used willpower was perceived as higher in self-control than a person who used strategies; both were rated as higher in self-control than a target in the control condition (who used neither). We also found that self-control judgments about fictitious people differ when accounting for participants' explicit beliefs about strategies. Participants who strongly endorsed the belief that strategies are indicative of self-control perceived people using strategies as higher in self-control relative to a control group in contrast to those who did not believe that strategies are indicative of self-control. Those who believed that strategies were indicative of self-control also reported a greater likelihood to use strategies themselves in the next week.

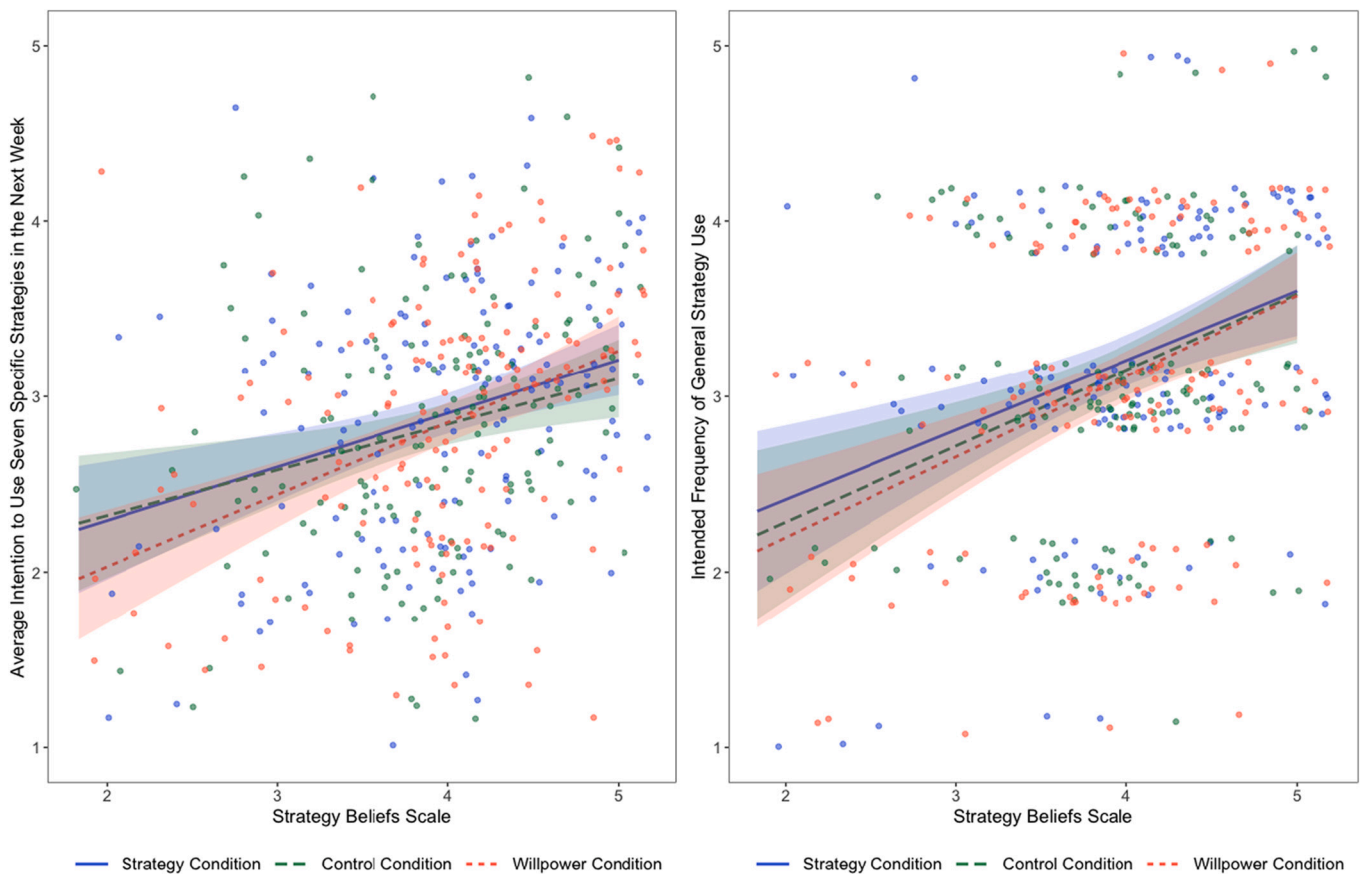


Fig. 2. Intentions to use strategies in the next week by person condition and strategy beliefs scale. Note. Ribbons represent 95% confidence intervals.

## 9. Experiment 5

In the final experiment we examine the causal effect of lay beliefs in strategies as indicative of self-control by experimentally manipulating lay beliefs. We expected that when the belief that strategies are indicative of self-control is salient, participants will be more willing to use strategies, and will rate a person using strategies as higher in self-control than when the belief that willpower is indicative of self-control is salient. These hypotheses, the data collection plan, design, and analyses were preregistered: <https://aspredicted.org/gi8dk.pdf>.

### 9.1. Pilot

In an initial pilot study, we randomly assigned participants to either read an article about the role of willpower in self-control (“...Strength of will makes the choice for goals and against temptations easier. With willpower we resist temptations through inhibition and mental strength...”) or an article about the role of strategies in self-control (“... Many strategies can be used to set up our environment to make the choice for goals and against temptations easier. Strategies eliminate temptation or lead us to think of temptation in ways that make it less tempting...”). Both articles were between 220 and 280 words long (see <https://osf.io/7vqth/> for full survey). After reading the article and providing a brief summary of the article (which also served as open-ended attention check), participants completed the same six item strategy beliefs scale outlined in Experiment 4 (Cronbach’s  $\alpha = 0.72$ ). Participants in the strategies condition scored non-significantly higher on this scale than participants in the willpower condition,  $t(93) = -1.50, p = .138, d = 0.31$ . This analysis had 80% power to detect an effect size of  $d = 0.37$ . Although the overall test was non-significant, the manipulation had a small effect ( $d = 0.31$ ) on shifting beliefs. We used this effect size to calculate the sample size necessary to detect an effect of this size in a more high-powered experiment (one-tailed), and recruited a sample of this size for Experiment 5. We also slightly amended the materials used (by including a visual that reinforced the message of the article) to strengthen our manipulation (see Appendix B for the exact articles participants read in Experiment 5).

### 9.2. Method

After an initial demographic survey, participants were randomly assigned to the willpower condition or the strategies condition, using the manipulation tested in the pilot experiment. Participants then rated their own intentions to use strategies in the next week on a general frequency item (“How often will you use strategies in a typical day in the next week?”) and on a more detailed scale that assessed seven different categories of strategies (“I will commit myself in advance to goals I want to achieve (e.g., by committing to deadlines, by telling other people about it)”) as well as one item on willpower use (“I will simply keep myself from acting on unwanted desires (e.g., I use willpower)”), as in Experiment 4. Likelihood judgments for the seven strategies were aggregated (Cronbach’s  $\alpha = 0.70$ ). We also assessed shifts in person perception for people who were described as using strategies or willpower to control temptation, using three of the vignettes (social media, gym attendance, saving), and the single self-control item rating used in Experiment 2.

### 9.3. Results

An independent  $t$ -test (preregistered) showed that participants in the strategies condition reported intentions to use strategies in general more frequently ( $M = 3.37, SD = 0.83$ ) than participants in the willpower condition ( $M = 3.17, SD = 0.84$ ),  $t(269) = -2.03$ , one-tailed  $p = .022, d = 0.25$ . However, participants in the strategies condition did not report a higher likelihood of using the seven specific strategies ( $M = 2.80, SD = 0.65$ ) than participants in the willpower condition ( $M = 2.79, SD =$

$0.66$ ),  $t(268) = -0.70$ , one-tailed  $p = .472, d = 0.01$ . This analysis (one-tailed) had 80% power to detect an effect size of  $d = 0.30$ . In an exploratory analysis (preregistered), we also examined participants’ intentions to use willpower. An independent  $t$ -test showed that participants in the willpower condition reported intentions to use willpower to overcome temptation more frequently ( $M = 3.21, SD = 1.17$ ) than participants in the strategies condition ( $M = 2.91, SD = 1.20$ ),  $t(268) = 2.09$ , two-tailed  $p = .037, d = 0.25$ .

Next, we examined whether the beliefs manipulation affected person perception. In a multilevel regression model in which responses were nested within participants we examined self-control ratings across the three vignettes simultaneously while accounting for within-participant variance (preregistered). The intra-class correlation (ICC) supported the use of a multilevel analysis (ICC = 0.06), indicating that approximately 6% of the variance in self-control ratings could be attributed to the between-person level and approximately 94% of the variance existed at the within-person level. In the multilevel regression model, we regressed self-control ratings on condition (0 = willpower, 1 = strategies), strategy use (person used willpower, person used self-control strategy), and their interaction term. As expected, the interaction between condition and strategy use significantly predicted self-control ratings,  $b = -0.61, se = 0.12, 95\%CI [-0.85; -0.36], t(1352) = -4.93, p < .001$  (Fig. 3). In the willpower condition, participants perceived the person using willpower as having more self-control ( $M = 5.84, SE = 0.08$ ) than the person using strategies ( $M = 3.94, SE = 0.08$ ),  $b = 1.90, se = 0.09, 95\%CI [1.73; 2.07], p < .001$ . In the strategies condition, this difference was attenuated although participants still perceived the person using willpower as having more self-control ( $M = 5.42, SE = 0.08$ ) than the person using strategies ( $M = 4.13, SE = 0.08$ ),  $b = 1.30, se = 0.09, 95\%CI [1.12; 1.47], p < .001$ .

In an additional multilevel regressions we also controlled for vignette (social media, gym, savings), the interaction remained significant,  $b = -0.61, se = 0.12, 95\%CI [-0.84; -0.37], t(1353) = -4.95, p < .001$ .

### 9.4. Discussion

In this experiment, participants who read about strategy use being

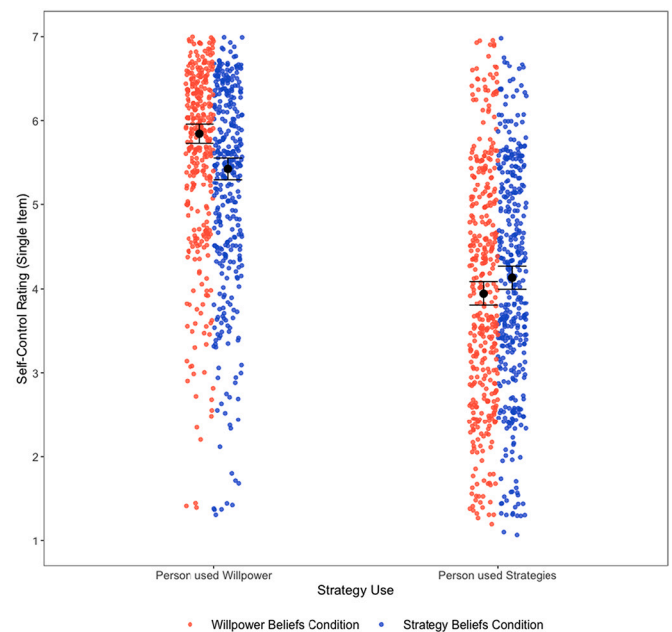


Fig. 3. Perceived self-control of the fictional person by strategy use and beliefs condition.

Note. Error bars represent 95% confidence intervals. Black circles represent mean ratings of perceived self-control.



indicative of self-control intended to use strategies significantly more often in the next week than participants who read about willpower being indicative of self-control. This effect did not extend to the intended use of specific strategies but did extend to being less willing to simply suppress temptation via willpower. One possible reason for the lack of change in people's willingness to use specific strategies might be that people tend to use strategies that 'fit' with their personality and situation (Peez & Davydenko, 2021) and the seven specific strategies we asked participants to rate might not have fit equally well for all participants. Thus, participants who believe that strategy use is indicative of self-control might be more willing to use strategies in the abstract sense but which exact strategies they are willing to use depends on their personal preference.

Furthermore, while participants again perceived hypothetical others as higher in self-control if they were described as using pure willpower to counter temptation than if they were described as using specific strategies to reduce temptation, this perception was attenuated in the condition describing strategies as indicative of self-control. While this experimental manipulation of strategy beliefs suggests that people's beliefs can be shifted in a meaningful way, the manipulation might have introduced demand characteristics to provide responses that align with the information provided in the article. Thus, judgments about other people described as using strategies might capture participants' desire to give the 'correct' answer according to study materials rather than a deeper shift in beliefs. In other words, possible demand characteristics of the manipulation limit the conclusions that can be drawn from the experiment.

## 10. General discussion

There are many ways to resist temptations and make goal-oriented decisions. Our experiments show that the way people control their temptations has implications for how they are perceived by others. While both those who use self-control strategies to reduce temptations and those who use pure willpower to suppress temptation were seen as high in self-control, fictional people described as using strategies were seen as relatively lower in self-control (Experiments 2–5). This difference was reduced for those participants who scored high on a scale of strategy beliefs (i.e., a scale assessing beliefs about strategies being indicative of self-control, Experiment 4) and was reduced for those who were assigned to read an article about strategies being an important facet of self-control (Experiment 5). In addition, strategies beliefs were linked to more intentions to use strategies oneself (Experiments 4–5). In sum, lay beliefs appear to link the act of using self-control strategies to self-control to a lesser degree than the act of suppressing impulses with willpower, suggesting that willpower is more central to people's idea of self-control than self-control strategies. Given recent findings that strategy use is more common among people high in self-control (e.g., Leduc-Cummings et al., 2022) and is a more sustainable way to pursue goals over time (e.g., Milyavskaya & Inzlicht, 2017), these lay beliefs do not correspond well with the empirical knowledge to date.

### 10.1. Contributions

Researchers' understanding of the processes underlying what makes people good at self-control has evolved over time from focusing on willpower to focusing on other aspects, such as self-control strategies. However, what has until now received little attention is what laypeople think about the use of strategies for self-control. Past research has shown that laypeople consider internal strategies as more central to self-control than external strategies (Bermúdez et al., 2021) and immediate temptation control strategies as more central to self-control than plans for future temptation control (Irving et al., 2022). The present research focuses on general assumptions about self-control strategies rather than a contrast between individual strategies. This research contributes to the literature on lay theories about self-control by showing that while both

self-control strategies and willpower use are seen as indicative of self-control, there are meaningful variations between people and across time in the degree to which strategy use is seen as indicative of self-control.

Our research might also contribute to the more general field of behavior modification programs (Griffiths et al., 2009; Gulliver et al., 2010). People like to think of themselves in favourable ways (Heine, Lehman, Markus, & Kitayama, 1999), including maintaining a positive view of their self-control. Therefore, interventions focused on improving self-control might benefit from also targeting lay beliefs about strategy use in addition to teaching the content of strategies. For example, interventions might not only address the effectiveness of specific strategies but also link the use of strategies to desirable personality traits or person descriptors. Research on the effectiveness of financial self-control strategies has shown that teaching participants specific strategies was not as effective for their actual spending as leaving it up to participants to choose their own strategies (Peez & Davydenko, 2021). This suggests that people need to be convinced to use strategies – lay beliefs about what strategy use says about themselves as a person might be one of the ways that can convince people to implement advised courses of action.

### 10.2. Limitations

All our experiments examining inferences about people examine these in the context of fictional vignettes. Results might not generalize to person perception about real people that are observed in more than one context. For instance, closeness among targets and observers is associated with greater trait judgment accuracy (Funder & Colvin, 1988), in part because close others have more access to trait-relevant information (Funder, 2012). In other words, learning that someone uses a strategy might be only a small part of everyday trait self-control judgments.

The vignettes were necessarily contextually abstract. In online supplements we provide additional information on self-control judgments as a function of the specific vignettes (Experiment 2 and 5), showing that not only the use of strategies versus willpower, but also the type of temptation and type of strategy might influence judgments of trait self-control. Note, however, that results were similar across the different vignettes suggesting an underlying emphasis of willpower over strategies as a self-control indicator across different contexts.

Both the scale assessing lay strategy beliefs (Experiment 4) and the article manipulating strategy beliefs (Experiment 5) might have introduced demand characteristics, nudging participants to provide responses that they believe align with the experiment materials rather than those reflecting their true beliefs. To reduce demand characteristics for the scale, half the items were reverse coded, to reflect both possible viewpoints. To reduce demand characteristics introduced by the article, we instructed participants that "There are no right or wrong answers, we are interested in your opinion". However, it cannot be ruled out that demand characteristics might have played a role in the effect between conditions. Future research might consider extending the time between the lay beliefs' manipulation and subsequent questions to reduce any potential carryover effects, or to manipulate lay beliefs indirectly rather than via explicitly given information.

### 10.3. Future directions

In several of the experiments we use the term "self-control" in participant-facing materials (we avoided this term in Experiment 1 and 3, instead using the terms and phrases of a trait self-control scale to describe the concept). As with any examination of lay beliefs, the choice of label might have influenced participants' judgments. For example, a lay understanding of the term self-control might see it as synonymous with willpower. Future research should test whether the present findings replicate when using terms that are less likely to be seen as synonymous with willpower such as "goal attainment" or by avoiding any explicit references to the concept.

Relatedly, the concept of willpower might be conflated with effort. Past research has shown that people make more positive trait judgments toward others when effort is explicitly emphasized (Kristal & Zlatev, 2021). It is possible that by highlighting targets as using “pure willpower” when contrasted with strategies contributed to a more positive assessment of self-control because effort was emphasized. Future research should consider assessing and controlling for perceptions of effort to better understand whether the valuation of effort contributes to variations in self-control judgments.

The present experiments focused on contrasting use of strategies with willpower. This approach contrasts with others that have compared different types of self-control strategies (Bermúdez et al., 2021; Irving et al., 2022). Future research might further distinguish different stages of strategy use (e.g., process model; Duckworth et al., 2016) to examine whether strategy type influences judgments of self-control. For example, situational strategies addressing possible temptations in advance tend to be more effective (Duckworth et al., 2016) than reactive strategies employed when already facing the temptation. Do people distinguish between these types of strategies in their attributions of self-control? Setting up a situational context that limits the likelihood to give in to temptation might require more foresight whereas reactive strategies might require more mental effort. Distinguishing lay beliefs about specific strategy use might also help explain some of the null effects we found in Experiment 5, where the manipulated beliefs about strategies affected only general willingness to use strategies but not willingness to use specific strategies.

In addition, future research may also consider examining the role of strategy success on self-control judgments – would participants be rated as high in self-control if they used willpower but did not successfully refrain from temptation, or indulged only partially? For example, would someone who is offered a bag of chips and uses willpower to eat only two, be considered as high or low on self-control (compared to another person who eats none, or who eats many chips)? Another question to consider is whether both personal experience and strategy success impact the development of strategy beliefs. For example, would those who use willpower themselves be more likely to believe that it is indicative of good self-control?

#### 10.4. Generalizability of conclusions

Participants in these experiments were recruited from North American populations. Lay beliefs about willpower, self-control, and strategies likely have cultural connotations (Han, Lee, Ohtsubo, & Masuda, 2022; Li, Li, Vazsonyi, & Dou, 2018; Savani & Job, 2017; Yanaoka et al., 2022) and might not generalize to participants from other cultures. For example, in cultures where self-discipline is especially valued (e.g., tight vs. loose cultures; Gelfand et al., 2011; Harrington & Gelfand, 2014) people might show even stronger preference for suppression of temptation rather than managing temptation in their concept of self-control.

### Appendix A. Strategy beliefs scale

A self-control conflict is a conflict that arises when you face a temptation/desire (e.g., your favorite dessert, sales in your favorite store, etc.) when in pursuit of a long-term goal (e.g., maintaining health, saving money, etc.).

Sometimes people use pure willpower to suppress these temptations.

Sometimes people use strategies - little tricks people play on themselves to make them do the things they ought to do or to keep us from the things they ought to avoid. For example, they may put their favorite candy out of reach for the moment of temptation, they may promise themselves small rewards for following their meal plan, they may surrender authority to a trustworthy friend who will police their calories.

How do you feel about people using strategies to pursue their goals?

1. A person has inadequate self-control if they have to use strategies to achieve their goals. (*reverse coded*)
2. I would be impressed with a person's self-discipline if they used strategies.
3. A person who avoids temptations to make it easier on themselves is weak-willed. (*reverse coded*)
4. Using strategies to make goal pursuit easier would mean a person has strong self-control.

Participants in these experiments were from online crowdsourcing websites. We took many precautions to ensure good data quality and participants showed good engagement with the experiments as evident in the lengthy written responses and high scale reliabilities. However, crowdsourced samples might differ from the general population in the following way: they are often younger, more educated, and predominantly White (see Goodman & Paolacci, 2017 for a review). Results might also not generalize to specific populations such as children (but see Haimovitz, Dweck, & Walton, 2019, for beneficial framing effects of willpower in preschool-aged children). Future studies examining the potentially different lay beliefs about self-control across diverse populations would contribute to an understanding how lay beliefs may develop over the lifespan or shift depending on cultural influences.

### 11. Conclusion

Our research underlines the importance of understanding the beliefs people hold about the use of self-control strategies. When it comes to self-regulation, “many roads lead to Rome” (Hennecke & Bürgler, 2020), but which road is taken appears to matter for how the traveller is perceived by others. Our experiments show that there are individual differences in lay beliefs about the use of strategies that are both predictive of one's own behavioral intentions and malleable. Finding ways to promote strategy lay beliefs in a way that increases people's willingness to recognize the many roads they can take to achieve their goals might increase the chances that they find a path particularly suitable to them.

#### Open science practices

All materials, data, and SPSS syntax files for all experiments are available for download (<https://osf.io/6ezsk/>).

#### Author note

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#### Conflict of Interest

None.

#### Data availability

Full materials, data and syntax for all experiments are available on OSF: <https://osf.io/6ezsk/>.

5. If someone has to trick themselves into keeping their goals that would mean that they lack self-control. (reverse coded)  
 6. If someone made a habit of using strategies, I would be confident in their ability to control themselves.

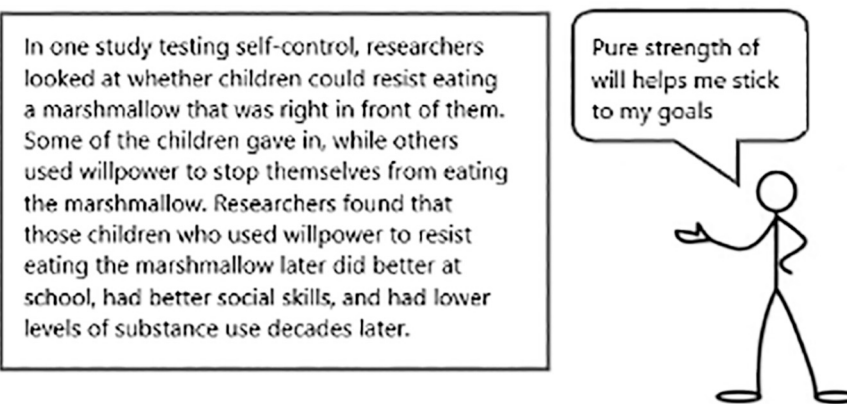
## Appendix B. Articles used to manipulate lay beliefs in Experiment 5

### Willpower is Central to Self-Control

"Strength does not come from physical capacity. It comes from an indomitable will."  
 -Mahatma Gandhi

We face temptations every day. Strength of will makes the choice for goals and against temptations easier. With willpower we resist temptations through inhibition and mental strength. For example, when a dieter is faced with the temptation of a delicious looking cookie, they can suppress the impulse to eat the cookie.

We rely on willpower to exercise, diet, save money, quit smoking, stop drinking, overcome procrastination, and ultimately accomplish any of our goals. It impacts every area of our lives.



Using willpower can help people resist in-the-moment temptations. Over time, using willpower is correlated with positive life outcomes such as better grades, higher self-esteem, lower substance abuse rates, greater financial security, and improved physical and mental health. Self-discipline and strength of will is one of the most important psychological resources in our life.

## Appendix C. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jesp.2023.104457>.

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