Received: 6 July 2020 | Accepted: 25 October 2020

DOI: 10.1111/jopy.12604

ORIGINAL MANUSCRIPT

WILEY

Self-control in daily life: Prevalence and effectiveness of diverse self-control strategies

Marina Milyavskaya[1] | **Blair Saunders**[2] | **Michael Inzlicht**[3]

[1]Department of Psychology, Carleton University, Ottawa, ON, Canada

[2]School of Social Sciences, University of Dundee, Dundee, UK

[3]Department of Psychology and Rotman School of Management, University of Toronto, Toronto, ON, Canada

Correspondence
Marina Milyavskaya, Department of Psychology, Carleton University, Ottawa, ON K1S 5B6, Canada.
Email: marina.milyavskaya@carleton.ca

Funding information
This research was supported by grants from the Social Sciences and Humanities Research Council of Canada (SSHRC) to Marina Milyavskaya and to Michael Inzlicht, as well as a grant from the Natural Sciences and Engineering Research Council of Canada (NSERC) to Michael Inzlicht.

Abstract

Objective: What strategies do people use to resist desires in their day-to-day life? How effective are these strategies? Do people use different strategies for different desires? This study addresses these questions using experience sampling to examine strategy use in daily life.

Method: Participants ($N = 197$, $M_{age} = 20.4$, 63% female) reported on their use of six specific strategies (situation modification, distraction, reminding self of goals, promise to give in later, reminder of why it is bad, willpower) to resist desires (4,462 desires reported over a week).

Results: Participants reported using at least one strategy 89% of the time, and more than one strategy 25% of the time. Goal reminders and promises to give in later were more likely to be used for stronger desires. People also preferred different strategies for different types of desires (e.g., eating vs. leisure vs. work, etc.).

Conclusion: In contrast to recent theoretical predictions, we find that many strategies, including inhibition, are similarly effective and that using multiple strategies is especially effective.

KEYWORDS

desire, experience sampling, self-control, self-regulation, strategies

1 | INTRODUCTION

Temptations are common in everyday life. From food advertising and drugs to sexual imagery and social media, our environments frequently cue desires that sometimes conflict with our personal goals (e.g., to eat healthily, maintain marital fidelity, save money, or complete a work task). People regularly experience desires (~64%–73% of their days; Hofmann, Vohs, et al., 2012; Milyavskaya & Inzlicht, 2017; Wilkowski et al., 2018), and often report trying to resist temptation (~42% of the time; Hofmann, Baumeister, et al., 2012). The very idea of deliberately overcoming unwanted impulses, temptations, and desires is central to the concept of self-regulation (Vohs & Baumeister, 2004). Less understood, however, is exactly how people overcome temptation. When individuals report "resisting" their desires, do they use some mental strength (i.e., willpower) to "just say no," or do they use a range of strategies? Do people favor the same strategies to counter all forms of temptations (i.e., a desire is a desire is a desire), or are specific strategies preferred for certain types of desires? Here, we address these questions using experience sampling methodology to document the strategies that people use to regulate multiple desires in their everyday life.

1.1 | Self-control strategies

We define self-control as "the process or behavior of overcoming a temptation or prepotent response in favor of a competing goal" (Milyavskaya et al., 2019). Here, any desire that is considered problematic in that instance (because it interferes with a focal goal) can be considered a temptation, even if at another time that desire would be unproblematic. For example, the desire to use social media could be, at different

times, either a temptation distracting from work, or a means to attain a social goal (and thus, unproblematic). Willpower, or the ability to actively inhibit unwanted impulses, is frequently identified as the primary process for overcoming desires (Baumeister, 2014). However, temptations can also be counteracted using multiple alternative or proactive strategies, such as making plans, changing your situation, re-evaluating your desires, or forming "good" habits (Fujita, 2011; Gillebaart & de Ridder, 2015). Sometimes referred to as effortless self-control (Fujita, 2011), this represents one component of broader self-regulation which involves other actions in service of a goal (planning, monitoring goal pursuit, etc.; see Gillebaart, 2018).

To better understand the different strategies that people use to self-regulate, Duckworth, Gendler, et al. (2016) have proposed a process model of self-control (see Figure 1). Drawing from the process model of emotion regulation (Gross, 1998, 2015a), this model proposes that feelings of desire follow a cyclical pattern; as feelings of desire arise and crest, a person can intervene at specific stages in the cycle. First, a person can proactively ensure that they do not encounter a desire-evoking situation (*situation selection*; e.g., not keeping cookies in the house; leaving your cell phone at home when going to the library to study), or change a situation (*situation modification*; e.g., putting the cookies in the back of the pantry where they will be out of sight; turning the cellphone to airplane mode to not get notifications while studying). In a problematic situation, a person can shift their attention away from the desire by distracting themselves (*attention deployment*), or changing how they think about the conflict (*cognitive change*). Finally, a person can simply resist, using brute force mental resistance—this is referred to as *response modulation* or *inhibition*, and is in line with the lay-person understanding of willpower as "just saying no."

Many strategies that fit within the above framework have been studied in specific real-world and lab contexts, and are found to be effective in reducing desire. Supporting the effectiveness of *situation selection*, avoiding triggers associated with substance use helps individuals with addiction approach abstinence (Bernheim & Rangel, 2004; Farabee et al., 2002), and placing yourself farther away from tempting foods is related to reduced consumption (e.g., Bucher et al., 2016). Similarly, research on saving behaviors demonstrates the effectiveness of pre-commitment devices (i.e., setting your situation up in a way to facilitate goal pursuit) such as automatic transfers into a savings account to achieve savings goals (Rogers et al., 2014). And in the academic domain, students instructed to remove temptations from their environment

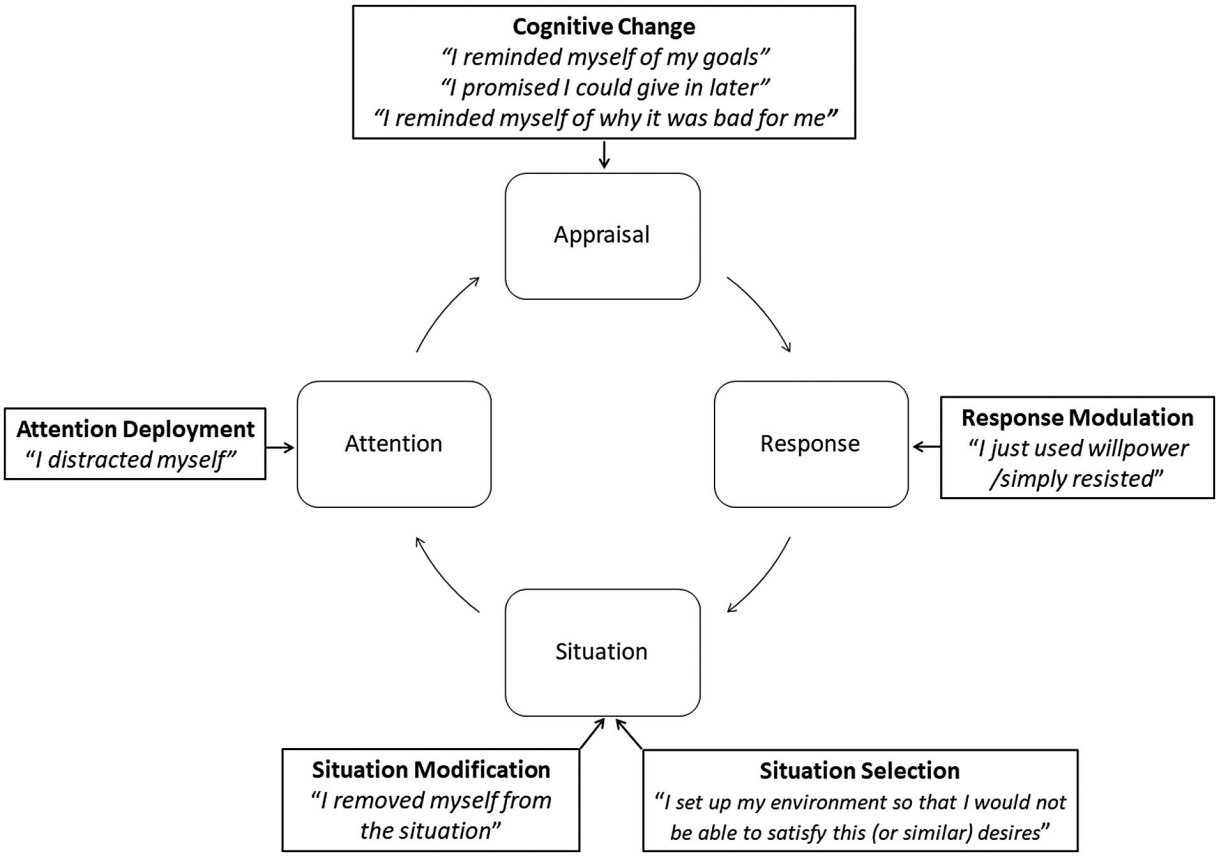

FIGURE 1 Illustration of how the self-control strategies under investigation in the current work fit into Duckworth, Gendler, et al. (2016) process model of self-control

reported greater attainment of their personal academic goals than students instructed to use willpower, or those in a control condition (Duckworth, White, et al., 2016).

In support of strategies targeting attention, in the well-known marshmallow studies, children were instructed to use *attentional deployment* (closing their eyes or look away from the marshmallow) to delay gratification (Mischel & Rodríguez, 1993; see also Mischel et al., 1972). In these studies, using *cognitive change* (imagining marshmallows as white clouds) was also an effective strategy for delaying gratification (Mischel & Rodríguez, 1993). Further support for the effectiveness of cognitive change is seen in the financial domain, where thinking about money as a bonus or windfall predicts greater spending and less savings, compared to thinking about the same money as a rebate or earned income (Epley et al., 2006; Thaler & Shefrin, 1981). And in the context of dietary self-regulation, focusing on the negative health consequences of high-calorie "junk foods" results in reductions in self-reported desire (Giuliani et al., 2013). There is thus evidence for the effectiveness of self-control strategies; however, the prevalence of the use of these strategies in daily life, and their relative effectiveness, has remained largely unexplored.

1.2 | Theoretical considerations and outstanding questions about strategy use

A key prediction of process models is that strategies that intervene during impulse generation should be more effective (Duckworth, Gendler, et al., 2016). This parallels similar arguments in the emotion regulation literature (Gross, 2001, but see Sheppes & Gross, 2011, for a variation). That is, strategies that target the situation should be more effective than cognitive strategies, and both of those should be more effective than strategies that attempt to override fully developed desires (i.e., willpower). The putative impotency of response modulation mirrors the ineffectiveness of expressive suppression during emotion regulation (Roberts et al., 2008), and previous research that finds that trying to mentally override the contents of the mind can ironically increase the saliency of unwanted cognitions (Wegner, 1989; Wyland et al., 2003). Conversely, some research has also indicated that each strategy—including willpower—contributes similarly to successful goal pursuit (Williamson & Wilkowski, 2020), and is similarly correlated with well-being (Nielsen et al., 2019). However, no research has compared the effectiveness of these various strategies on successful self-control of desires in the moment; such an analysis would represent a critical test of the process model of self-control.

Much of the evidence-base supporting the efficacy of self-control strategies has focused on one strategy at a time, without testing the possibility that people use multiple strategies—perhaps even simultaneously—as they work toward their goals, or testing which strategies are used more often than others. Additionally, it is unknown whether people use these strategies differently for different types of desire. For example, would a person be more likely to remind themselves of their goal when faced with a tempting chocolate bar, but use willpower to resist falling asleep when they are feeling tired? And would these different strategies be equally effective across various desires, or would some strategies work better in some instances compared to others? These questions have not yet been investigated, and current theories of desire and self-control do not provide any guidance on likely hypotheses. Recent research in emotion regulation, however, has addressed some of these questions for controlling one's emotions, which can be considered a special case of self-control (Tice & Bratslavsky, 2000). Studies in this area have focused on the role of emotion intensity (Sheppes et al., 2011) and valence (Heiy & Cheavens, 2014), reappraisal affordances (Suri et al., 2018), and the type of emotion regulation goals (English et al., 2017; Millgram et al., 2019) in the selection of strategies. Overall, this research has shown that the emotion regulation strategy that a person chooses to enact at a given time can depend on a multitude of factors, and can be differentially effective. Other research has also shown that poly-regulation, or using multiple strategies at the same time, can benefit emotion regulation (Ford et al., 2019). While some of these findings can likely be translated to desires, such as the increased use of disengagement-focused strategies (e.g., distraction) as desire intensity increases (Sheppes et al., 2011), different contextual aspects of experiences of desire may be relevant for strategy use. For example, the type of desire (e.g., for food vs. for interpersonal interactions) may lead to different strategy use, and a strategy that can be used to resist a piece of chocolate cake may be less effective for resisting the pull of social media. In order to develop more comprehensive theories, descriptive data are needed to better understand how individuals use strategies to resist various desires in their day-to-day lives and the effectiveness of these strategies.

Another novel aspect of our study is a focus on situational constraints that prevent the possibility of enacting a desire. Prior research on desires (Hofmann, Vohs, et al., 2012) has examined the frequency of giving into desires, but has not distinguished between possible and impossible desires. For example, a person may have a craving for chocolate when no chocolate is available, or a desire for sexual intercourse at a time and place where there are no possible willing sexual partners. Indeed, sometimes situational constraints can prevent the adoption of a desire even if giving in is the prevailing response (Kotabe & Hofmann, 2015). This, however, has been ignored in prior experience sampling research, with the assumption that desire enactment or resistance is due to inhibitory self-control. In the present study, we examine how frequently situational constraints actually prevent people

from enacting desires; moreover, we examine how often this is due to the person actively setting up their environment to avoid the desire. Such situation selection has been repeatedly found to be an effective self-regulatory strategy (e.g., Duckworth, White, et al., 2016; Rogers et al., 2014), but its use in daily life remains unknown.

1.3 | Prior research on strategy use for self-control in daily life

To date, only three papers have investigated self-control strategy use in daily life. These studies all had a different focus from our study; we describe these studies and the differences from our research here. One study that examined strategy use in daily life focused on strategies for persisting at unpleasant but useful behaviors, such as studying or exercising (Hennecke et al., 2019). In their study, Hennecke and colleagues identified nine strategies that were each used over 10% of the time, and examined their relation to satisfaction with persistence (as a proxy for successful self-control). Four of these strategies were positively related to successful self-control, and one strategy was negatively related. Although the study by Hennecke and colleagues is an important first step in understanding strategy use in daily life, it focused on only one type of self-control dilemma (persisting at an unpleasant activity). This focus on persistence means that the data does not speak to strategy use for overcoming temptation—a central theme in self-control.

Two other experience sampling studies examined strategy use in the service of personal goals (Williamson & Wilkowski, 2020). At multiple times throughout the day, participants reported the extent to which they had used self-control strategies in the service of three personal goals. They focused on the five strategies identified by Duckworth, Gendler, et al. (2016)'s process model (situation selection, situation modification, distraction, reappraisal, and response inhibition), and found that participants reported using each strategy regularly (on more than 50% of all reports), and that there was considerable overlap among strategy use (i.e., many strategies were likely to be reported at any given time). Contrary to expectations, they found that all strategies positively related to goal progress, although this pattern was inconsistent across the two studies concerning the effectiveness of inhibition. This paper was the first to examine broad strategy use beyond perseveration in daily life. However, they focused on strategies used to pursue specific goals, rather than for resisting desires more broadly. In their studies, participants rated the extent to which they engaged in each strategy to help their goal pursuit, responding to items such as "I changed my situation to get rid of temptations that would have interfered with my goal" (*situation modification*), and "When I was tempted to do something that would have interfered with my goal, I simply tried to resist doing it" (*inhibition*). That is, their questions focused on desires/temptations that interfered with the focal goals; disagreeing with these questions may have been due to not using the strategy, or to not encountering a temptation that would have interfered with that particular goal. Although this research provided important information on strategy use in the service of goals, we still do not know what strategies people actually use to resist desires in their daily lives, the relative effectiveness of these strategies, or whether they differ across types of desire.

Additionally, another study (Wenzel et al., 2016) used nightly diaries to examine retrospective self-control in a situation where participants tried to inhibit or change an unwanted behavior. In this study participants could select between the strategies of monitoring, distraction, stimulus control (akin to situation modification), or doing nothing; results showed that stimulus control was the most effective strategy, but that there were some differences in strategy effectiveness based on desire strength and affect at the time of the desire (Wenzel et al., 2016). However, as this study only investigated a limited number of strategies, and participants were not able to select more than one strategy, it is unclear to what extent strategies are actually used simultaneously, and more importantly whether different strategies are used in different contexts.

In sum, previous research on strategies in daily life has either examined strategies to continue persistence on an unpleasant but useful behavior (Hennecke et al., 2019) or examined the strategies used to pursue specific goals (Williamson & Wilkowski, 2020), or limited strategies to change unwanted behavior (Wenzel et al., 2016). Furthermore, none of these studies examined whether strategy use varied across different contexts. In the present study, we go beyond this research to specifically focus on strategies for resisting desires. We ask participants about their use of the following strategies: *removing yourself from the situation*; *distraction*; *reminding yourself of why the desire was bad*, *reminding yourself about your goal*, *promising to give in later*, and *using willpower*.[1] In our study, we not only examine the prevalence of these strategies, but also their effectiveness in preventing desire enactment, and how their use and effectiveness differs across different types of desires (e.g., for food vs. media vs. sleep).

1.4 | Present study

We used an experience sampling protocol to examine self-regulation in daily life. We used a similar procedure as prior research in assessing current and recent desires, desire strength, resistance, and enactment (Hofmann, Baumeister, et al., 2012; Milyavskaya & Inzlicht, 2017). Departing from previous studies, we also asked about whether participants had the opportunity to enact the desire (and the reasons why not),

as well as asking about strategies used to resist the desire, to get at the *how* of self-control. This design allowed us to examine the prevalence and effectiveness of self-regulation strategies in daily life.

This is, to our knowledge, the first study to explore the simultaneous use of multiple self-regulation strategies to overcome momentary desires. The diversity of potential strategies and desires available to our participants, in addition to the lack of descriptive data in the context of everyday self-control, led us to approach our analyses in an exploratory, descriptive, sense. Nevertheless, recent theoretic frameworks (i.e., Duckworth, Gendler, et al., 2016) do make predictions about strategy preference and efficacy that are testable within our data set. Foremost, according to the process model, strategies that attempt to avoid or modify desire eliciting situations should reduce rates of desire enactment to a larger extent than later interventions (e.g., "I just used willpower/simply resisted"). Furthermore, recent finding from emotion regulation suggests that disengagement strategies are generally preferred to regulate particularly intense emotions (Sheppes et al., 2011). Consequently, people might prefer to use strategies that avoid mentally engaging with temptations (e.g., "*I distracted myself*") as desire intensity increases. It is important to note that this latter hypothesis emerged in the context of emotion regulation, and it is not clear if such strategies would necessarily apply to all targets of self-control. Given the limited (and sometimes contradictory) data about of the use and effectiveness of strategies in daily life, the primary goal of the current research was to describe self-control strategies used to overcome a wide range of momentary desires.

2 | METHODS

2.1 | Open science statement

The analytical plan was posted on the Open Science Framework (https://osf.io/m934b) after the data were collected but before anyone looked at any of the data.[2] Any additional nonregistered analyses are clearly labeled as such. As this was a large multi-part study, we collected additional data not relevant to the present paper; only measures relevant to the present paper are discussed below, but all materials are available on OSF.

2.2 | Participants and procedure

Participants ($N = 226$) were predominantly recruited through an undergraduate participant pool, though a smaller number were also recruited through on-campus and local advertisements. We initially aimed to recruit between 200 and 250 participants; this was determined by practical/financial considerations. Participants came into the lab for a two-hour session during which they completed questionnaires and computerized tasks while their brain activity was recorded with EEG (see OSF for full list of measures administered in this study). A week later, participants began the experience sampling portion of the study: each day for seven days, participants received seven signals with brief surveys. Using SurveySignal (Hofmann & Patel, 2015), these signals were sent at random times in seven equal intervals between 9:30 a.m. and 9:30 p.m.[3]

2.2.1 | Experience sampling

Figure 2 outlines the experience sampling questions administered in each "survey" (we use the term *survey* to mean all the questions asked at any one signal). In the experience sampling survey, participants were first asked about whether they were currently experiencing a desire or had experienced one in the past 30 min. If participants indicated that they were or had recently experienced a desire, they reported what the desire was for, choosing from among 23 categories (adapted from Hofmann, Baumeister, et al., 2012; see all materials on OSF). They then reported on desire strength, "how strong is/was the desire?", using a slider scale ranging from 1—*very weak*, to 7—*very strong*) and whether they had the opportunity to satisfy the desire (*y/n*). If they did not have an opportunity, they were asked to choose among possible reasons for not having an opportunity: "why did you not have the opportunity to satisfy the desire," along with four response options (*External circumstances prevented me*; *I set up my environment so that I would not be able to satisfy this (or similar) desires*; *I was with others who prevented me from satisfying this desire*; *Other*). If they indicated that they had the opportunity to satisfy the desire, they were asked about resistance ("did you try to resist the desire," using a slider with the anchors 1—*did not try to resist at all*, and 7—*tried very hard to resist*). Those who reported resisting at least somewhat (did not select 1) were asked about the strategies that they used to resist. Seven strategies were presented (see Table 1 and Figure 1), and participants could indicate more than one strategy. Participants then reported whether they gave in to the desire (*y/n*).[4]

2.3 | Data cleaning protocol

We first cleaned the data obtained from experience sampling. The original data file contained data from responses to 7,421 signals (out of 11,720 sent out). First, 239 surveys that duplicated finished surveys (i.e., where participants clicked on the same survey again) were removed. Nonfinished surveys that were left blank ($n = 148$) were removed; those that were

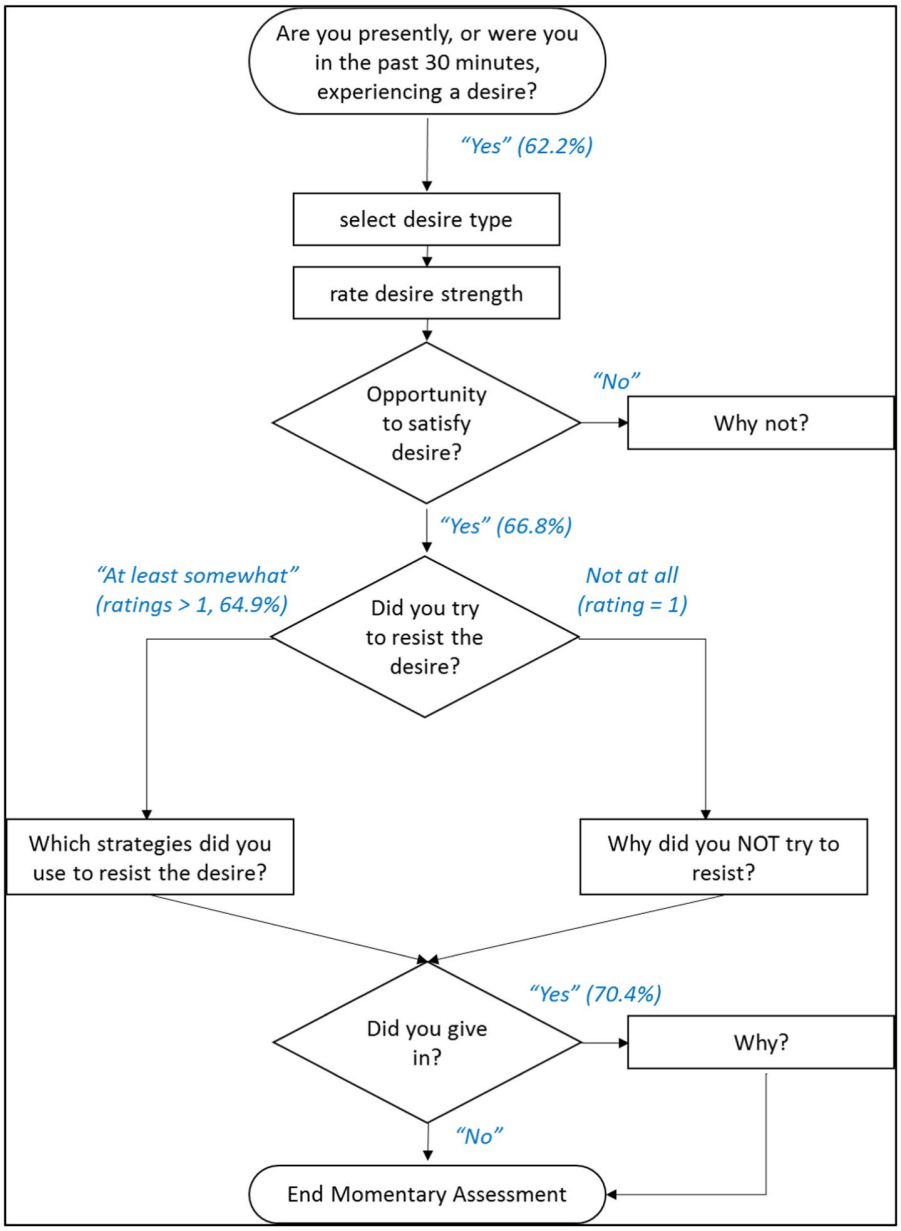

FIGURE 2 Flow chart depicting one momentary assessment from the experience sampling survey [Color figure can be viewed at wileyonlinelibrary.com]

partially completed were retained. Of these, 81 surveys were duplicates of mostly finished surveys and were removed (the more complete ones were retained, with any additional information from the later ones copied into it). In those cases ($n = 23$) where participants reported on a different desire in the duplicate survey, the later survey was retained. Surveys started within 20 min of a past survey were removed ($n = 72$) to avoid too much overlap; a further 68 surveys that were completed between 20 and 30 min were examined to see if the "desire over the past 30 min" overlapped with the desire from the previous survey; four such cases were removed. This resulted in 6,877 signals. We then removed responses from 12 participants who had each responded to less than 5 signals (31 responses removed), resulting in a final total of 6,845 usable signals for analysis (out of 9,653 total signals sent out to the participants who were at least somewhat compliant [responded to 5 or more surveys]; response rate of 71%). This represents usable data from 197 participants ($M_{age} = 20.4$, 63% female). The time interval between responses was on average 1:59 hr ($SD = 1{:}01$). Given that in this paper we focus on signal-level data, the available data (4,462 reports of desire) provides sufficient power for analyses.

2.4 | Analytic approach

Data cleaning, variable computation, and descriptive analyses were all conducted using SPSS 26. For all analyses, data were

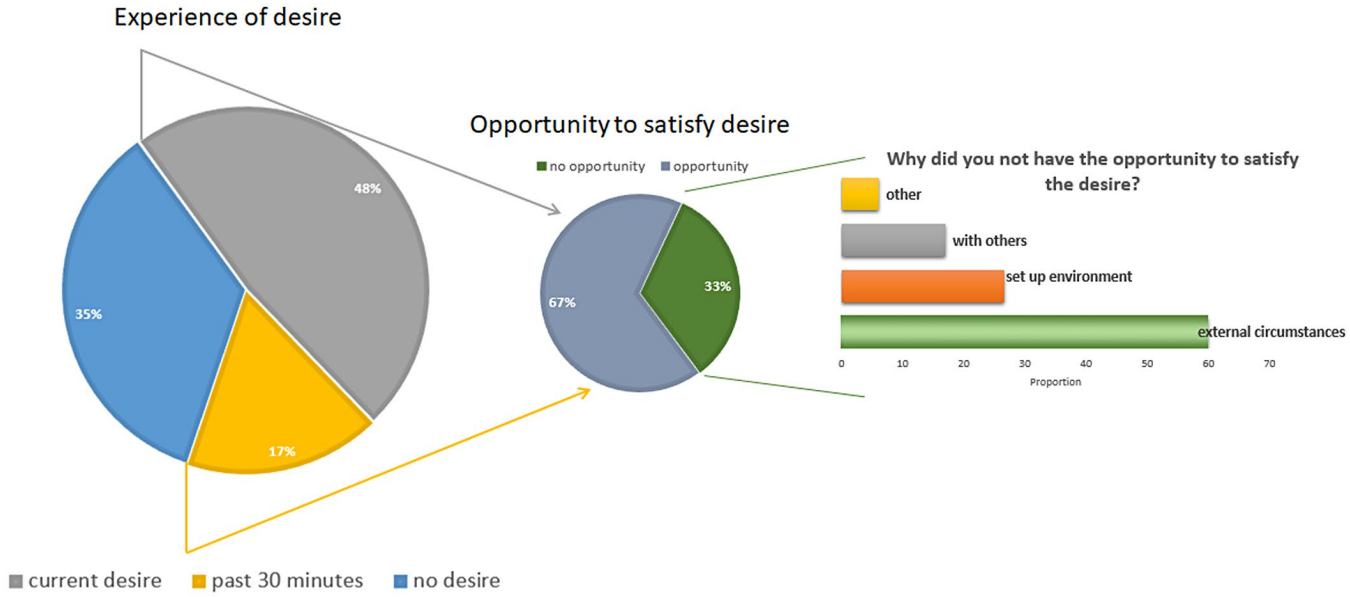

FIGURE 3 Prevalence of desire, opportunity for enactment, and reasons for lack of opportunity [Color figure can be viewed at wileyonlinelibrary.com]

modeled as 2-level (observations nested within person). Our key analyses concerned the likelihood of using each strategy, and the effectiveness of each strategy (i.e., likelihood of not giving in following strategy use); these were binomial variables.[5] In R software, we used the glmer function in the lme4 package (Bates et al., 2015) to estimate a series of mixed effects logistic regression models with random intercepts and fixed slopes. All cases used a maximum likelihood estimation with adaptive Gauss–Hermite quadrature. Confidence intervals were calculated using the standard errors, and the estimate and CIs were exponentiated to obtain odds ratios. A 3-level approach (observation nested within day nested within person) was also tried for key analyses, but in most cases the 3-level models provided a worse fit than the 2-level ones (see OSF for output).). Full code is available at https://osf.io/6f47c.

3 | RESULTS

3.1 | Descriptive statistics

In line with past research, participants reported experiencing a desire on 65.2% of all occasions (4,462 signals). Desires were generally rated as quite strong with a mean strength of 5.26 on a 1–7 scale (SD = 1.46). Participants reported that they had the opportunity to satisfy 66.8% of their desires (see Figure 3). The most frequent reason for not being able to satisfy the desire was because of external circumstances (59.9%), followed by participants setting up their environment so that they would not be able to satisfy the desire (26.6%). That is, on 8.8% of occasions (33.2% with no opportunity * 26.6% endorsed setting up environment), participants effectively engaged in situation selection (they experienced a desire that they could not satisfy because they had set up their environment in such a way that the desire could not be enacted).

When participants reported an opportunity to satisfy the desire, they tried to resist at least somewhat on 64.9% of occasions. The average strength of resistance was 2.90 overall (SD = 1.98), and 3.87 (SD = 1.77) for those desires that were resisted at least to some extent (i.e., after removing those who reported not resisting). Participants gave in to 70.4% of desires, including 94% of desires that they did not try to resist and 58.4% of the desires that they tried at least slightly to resist. This replicates previous research (Hofmann, Vohs, et al., 2012) showing that resisting desires is generally effective at *reducing* the rate of desire enactment; though we note that resistance was only somewhat effective, with fewer than half of desires resisted successfully.

3.2 | What self-control strategies do people use in daily life?

When trying to resist desires, participants use at least one strategy 89% of the time, and more than one strategy 25% of the time. Table 1 reports the proportion of times when each strategy was used. Reminding yourself of your goals, promising to give in later, using willpower, and distraction were the most commonly used strategies (20%–30% of resisted desires; see Table 1 for exact proportions). Situation modification (removing yourself from the situation) was the least frequently used (10.3% of resisted desires).

Figure 4 illustrates how frequently these strategies were used throughout the week. As can be seen, the frequency of use clearly differs between strategies (e.g., removal from situation

TABLE 1 Rates of strategy use, likelihood of strategy use as a function of desire strength, and strategy effectiveness

	% of possible answers	Likelihood of using strategy based on desire strength (Odds Ratio [95% CI])	Likelihood of resisting when the strategy was used (vs. not)
Resistance strategies			
I removed myself from the situation	10.3%	.92 [.81; 1.04]	**2.28 [.1.57; 3.30]**
I distracted myself	20.3%	.95 [.87; 1.04]	**1.42 [1.08; 1.85]**
I reminded myself of my goals	28.8%	**1.21 [1.10; 1.32]**	**1.58 [1.24; 2.02]**
I promised myself I could give in later	26.5%	**1.11 [1.01; 1.21]**[a]	**1.38 [1.08; 1.78]**
I reminded myself of why it was bad for me	16.6%	1.09 [.98; 1.21]	**2.11 [1.57; 2.84]**
I just used willpower/simply resisted	21.1%	1.03 [.94; 1.14]	**2.28 [1.73; 3.00]**
Other	4.8%	1.00 [.83; 1.20]	**.31 [.16; .57]**
None	10.9%	.98 [.84; 1.14]	**.06 [.04; .11]**
More than one strategy	25.7%	**1.16 [1.05; 1.29]**	**2.74 [2.08; 3.61]**

Note: For column 2, odds ratios represent the change in odds of using a particular strategy for each unit change of desire strength. Numbers greater than 1 represent greater likelihood of using the strategy as desire increases. For column 3, odds ratios represent the change in odds of successfully resisting (i.e., not giving in) to the desire when the strategy is used. Numbers greater than 1 represent greater effectiveness of the strategy; numbers less than 1 represent more likely to give into the desire, and can be interpreted as OR/1, such that an OR of .31 means 1/3 as likely to successfully resist, or 3 times more likely to give in (inverse of 1/3 is 3/1). Results for resistance strategies are reported only for those desires where participants had the opportunity and tried to resist at least a little (n = 1,943). Bold values represent a significant difference from 1 (as indicated by a nonoverlap of the odds ratio CIs with 1.

[a]This value is not statistically significant if an FDR correction is applied; see OSF for full output.

is used less frequently than goal reminders), however, this relative difference between strategy use appears to be relatively consistent across time of day and days of the week.

Next, we examined whether the strategies were more or less likely to be used as a function of desire strength. That is, are some strategies more likely to be used to resist stronger desires, while others are reserved for when desires are weak? Table 1 reports the odds ratios from analyses predicting strategy use from desire strength. Goal reminders and promises to give in later were more likely to be used for stronger desires (see Table 1 and Figure 5[6]). Notably, these can both be categorized as cognitive reframing; the other strategies were unrelated with desire strength—that is, they were not more likely to be used when encountering stronger desires. Participants were also more likely to report using more than one strategy for stronger desires.

3.3 | Which strategies stop people from acting on their desires?

We next examined the effectiveness of each of these strategies—that is, does using a strategy reduce the probability of acting on a desire, compared to not using the strategy? As can be seen in Table 1, all six strategies were related to more effective resistance, while using an "other" strategy and no strategies were related to less effective resistance (i.e., giving in to more desires). Table 1 reports the odds ratios, and Figure 6 illustrates these differences. Additionally, the more strategies participants used at one time (when looking at number of strategies as a continuous variable), the more likely they were to resist the desire (OR = 2.34, 95% CI [1.98; 2.77])—for every additional strategy used, participants were 2.3 times as likely to resist as when one fewer strategy was used.

Finally, in exploratory analyses, we examined whether some strategies were especially effective for stronger (compared to weaker) desires. We computed 8 models (one for each strategy, and one for using more than one strategy) that include the main effects of strategy use and desire strength, and their interaction. Although the only significant interaction was for the strategy of distraction, it can be seen in Figure 7 that many of the strategies seemed to work particularly well when desire was high (full output can be seen on OSF).

In sum, we found that while any one individual strategy was used fairly rarely (less than 30% of the time), at least one self-control strategy was used on 89% of occasions. Cognitive strategies (goal reminders and promises to give in later) were especially likely to be used when desires were strong, and using any of the strategies (except "other") lead to reduced enactment. This was especially true for strong desires when using distraction.

3.4 | Is self-control strategy use moderated by the type of desire?

In additional (not preregistered) analyses, we examined whether different strategies were more likely to be used,

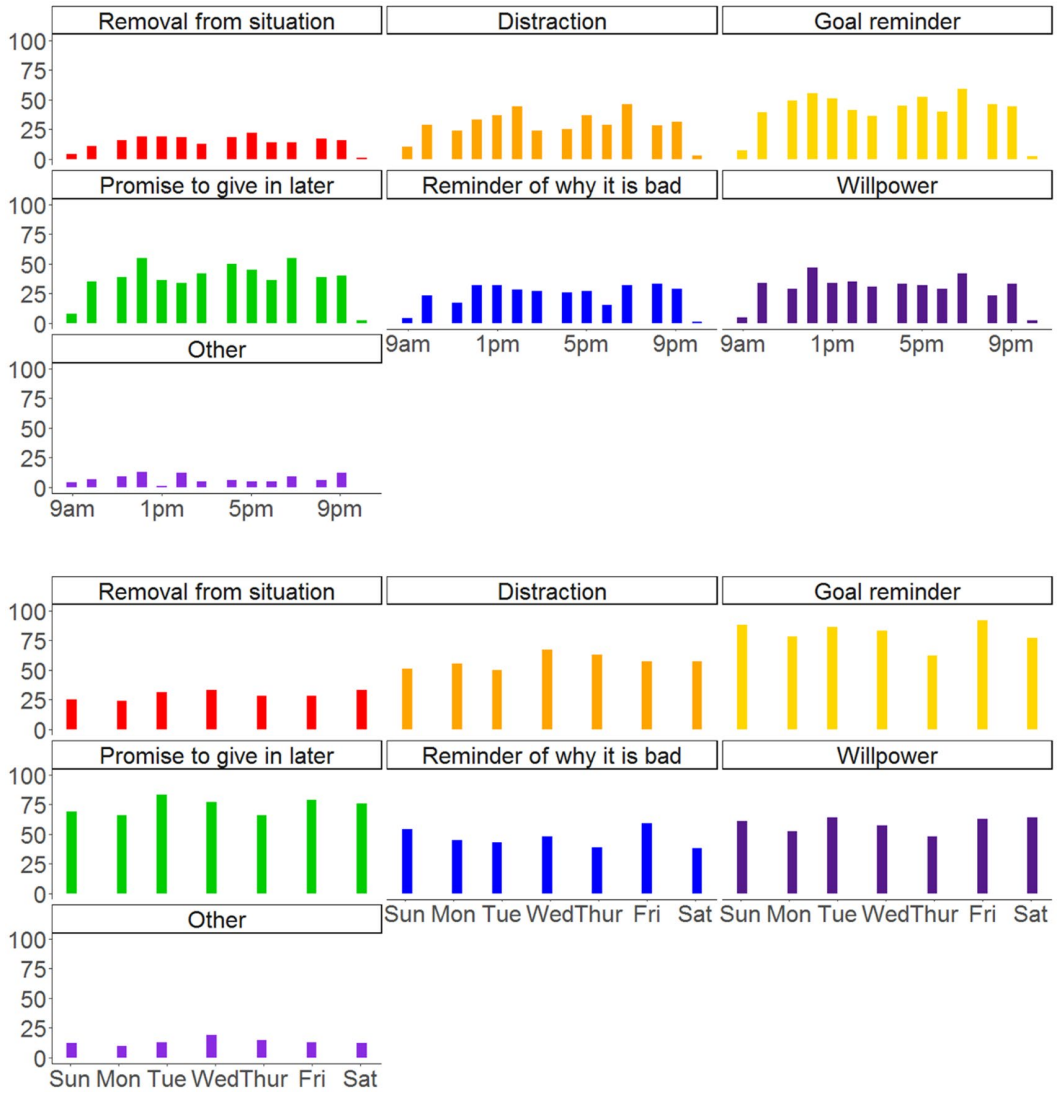

FIGURE 4 Frequency of strategy use by time of day (top panels) and day of the week (lower panels) [Color figure can be viewed at wileyonlinelibrary.com]

and were more effective, based on the type of desire that was experienced. The most frequently reported desire was for sleep ($n = 535$), followed by unhealthy ($n = 495$) and healthy ($n = 415$) food. To make the analyses more manageable, we combined categories (for full list and how they were combined, see https://osf.io/csdrn) to obtain seven broad categories of desires: food/drink; sleep/rest; work/study; media; social interactions; leisure; other. Given that examining the desires themselves was not our main objective, and has been done with similar data elsewhere (Hofmann, Vohs, et al., 2012), we report descriptive information on desire strength, resistance, and enactment in supplemental materials on OSF (https://osf.io/fm7cs). To examine whether some strategies are more frequently used for some types of desire (compared to on average), we coded all the strategies using unweighted effects coding (Aiken et al., 2012) to obtain 6 codes, each comparing that type of desire to the grand mean. We then conducted a series of multilevel analyses with strategy use (binary) for each strategy as the dependent variable, and the codes for desire category as the predictors. Table 2/Figure 8 reports all results; the odds represent the likelihood of using a strategy for a particular type of desire compared to the overall average use across all desires. Goal reminders were used more frequently than average to resist sleeping or resting and leisure desires, but less frequently for food-related desires. Promises to give in later were also more frequently used for leisure desires. For food and social desires, participants more frequently reminded themselves why these desires were bad for them. Willpower was more frequently used to resist desires for sleep/rest, and less frequently used to resist desires for working or studying. Additionally, people were very unlikely to use no strategies for resisting sleep—suggesting perhaps that this was a desire that people felt compelled to resist. When resisting the desire to sleep, people were more likely to use willpower and

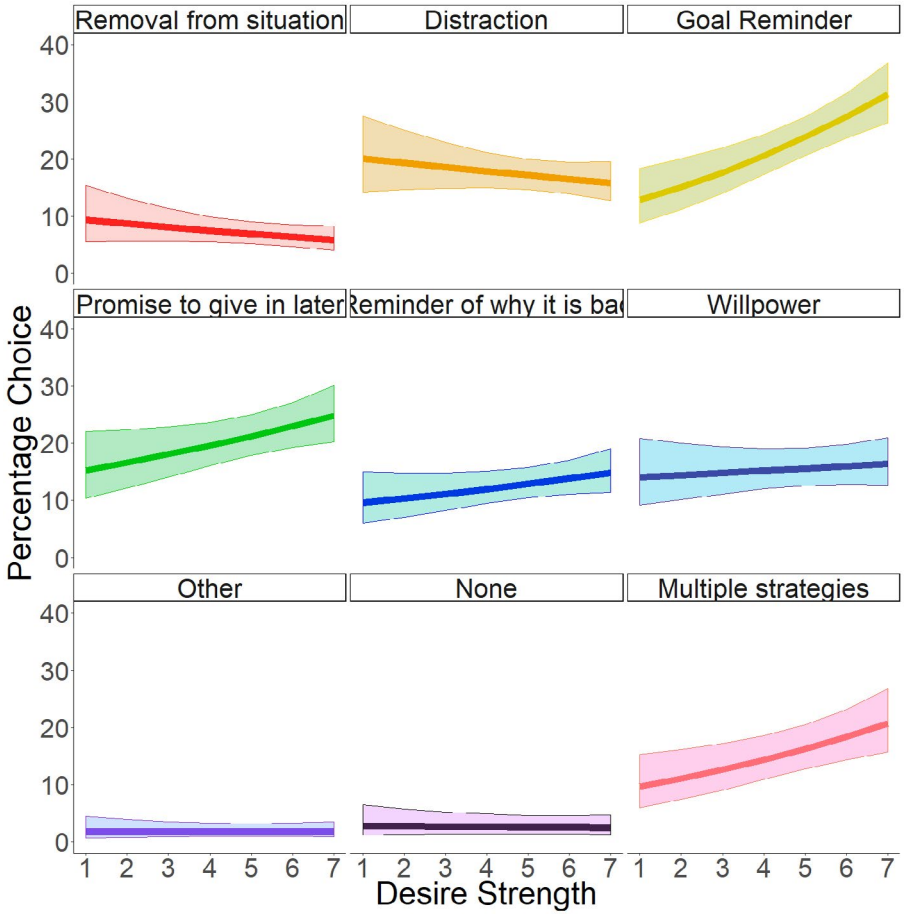

FIGURE 5 Predicted probabilities of using each strategy as a function of desire strength [Color figure can be viewed at wileyonlinelibrary.com]

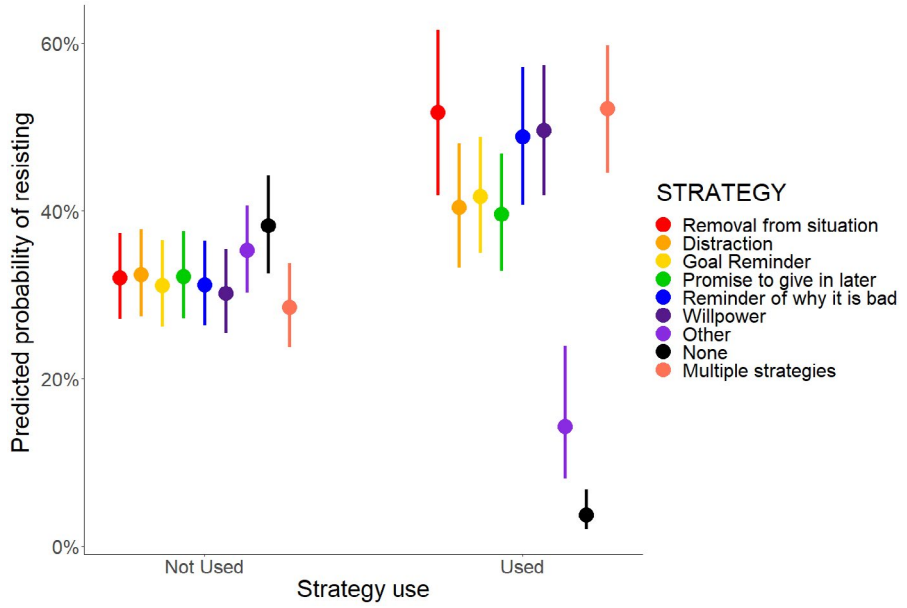

FIGURE 6 Predicted probabilities of desire resistance when a strategy was used versus not [Color figure can be viewed at wileyonlinelibrary.com]

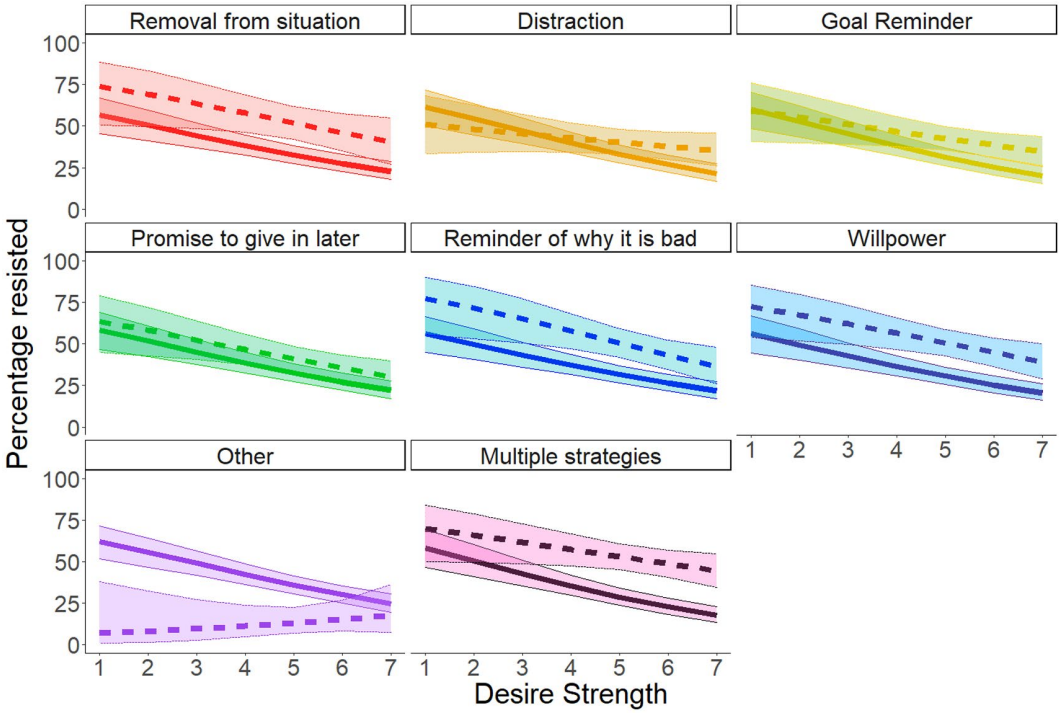

FIGURE 7 Predicted probability of successful resistance based on desire strength when each strategy is used (solid line = strategy not used; dashed line = strategy used) [Color figure can be viewed at wileyonlinelibrary.com]

remind themselves of their goals. Examining all desires (not just the ones where people tried to resist) showed that situation selection was also preferentially used to resist sleep/rest and social desires, and was much less used with work/study desires (perhaps reflecting that the latter were not problematic). Overall, these results suggest that people are using strategies preferentially, selecting (or avoiding) specific strategies for some desires but not others.

Finally, we examined whether some strategies are more effective for some types of desires. For each strategy, we conducted an analysis including a main effect of using that strategy (vs. not), the six deviation codes (testing main effects of desire type), and the interaction terms. We used the deviation codes for the desire types (6 codes in each analysis), as well as six new variables representing the interaction term between the strategy and each desire type. Successful resistance (a dichotomous variable) was used as the dependent variable in all cases. Table 3 and Figure 9 report all the odds ratios for each analysis. While generally strategies were equally effective across all types of domain, reminding yourself of your goals led to less successful resistance of the desire when the desire was work or study-related (OR = .25, 95% CI [.10; .61], and when it was media-related (OR = .53, 95% CI [.31; 93]), and more effective resistance when the goal was leisure-related (OR = 2.58, 95% CI [1.15; 5.77]); as we discuss below, this may have been the case because these desires were actually good for the participant (despite attempts at resistance). Removing yourself from a situation was also especially ineffective for resisting leisure goals (OR = .15, 95% CI [.04; .57]). Using multiple strategies was particularly effective in the social domain (OR = 3.21, 95% CI [1.18; 8.70]), and much less effective in the media domain (OR = .35, 95% CI [.19; .65]. Generally, these results show that with few exceptions, most strategies are equally effective in all domains.

4 | DISCUSSION

The present research was a first exploration of the use of self-regulatory strategies to resist desires in daily life. We examined six different strategies: *removing yourself from the situation*; *distraction*; *reminding yourself of why the desire was bad*, *reminding yourself about your goal*, *promising to give in later*, and *using willpower*. Overall, we found that people commonly used at least one strategy for resisting desires, and in 25% of cases more than one strategy is used. These strategies, however, were used variably for different types of desire, although (with a few exceptions), they were more-or-less equally effective. Using more strategies simultaneously led to greater self-regulatory success. Finally, we also examined the prevalence of successful situation selection, finding that 9% of desires are not enacted because the person has effectively engaged in *situation selection*, setting up their environment so that they could not enact the desire.

This research tests the predictions of previous theoretical work on strategy use (Duckworth, Gendler, et al., 2016; Gross, 2015a). According to Duckworth's 2016

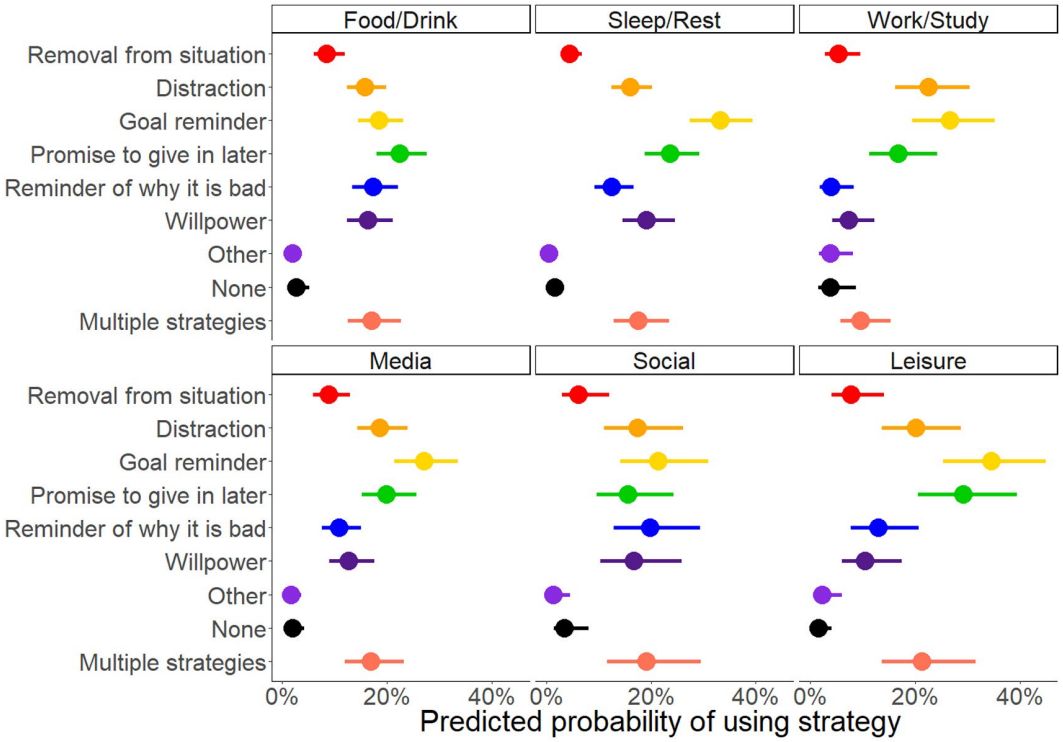

FIGURE 8 Likelihood of each strategy use for each type of desire [Color figure can be viewed at wileyonlinelibrary.com]

process model, strategies that intervene earlier in the impulse-generation cycle should lead to more effective self-control (i.e., reduced desire enactment). In support of this proposal, experimental studies have shown situation selection and reappraisal to be more effective than inhibition (e.g., Duckworth, White, et al., 2016) for improving the attainment of personal goals. Those studies, however, examined the broader implications of strategy use, rather than the effectiveness of the strategies to resist a specific desire at a given moment. In our study, we found that all strategies were effective relative to using no strategies; however, using willpower and removing oneself from the situation were slightly more effective than either distraction or promises to give in later. This suggests that, in contrasts with Duckworth's process model and research examining goal pursuit or self-regulation more broadly (e.g., Duckworth, White, et al., 2016), but in line with some recent findings (Williamson & Wilkowski, 2020) inhibition can be as effective as other anticipatory strategies, and that strategies that occur "earlier" in the process (i.e., situation modification) are not more effective. These differences in our research may be due to participants' understanding of strategy use. Perhaps, due to a lay understanding of self-control as willpower/resistance, participants attributed their self-regulatory success to inhibition (i.e., "I did not give in to my desire, therefore I must have used my willpower"). Alternatively, these results may also be due to the time course examined in these studies, such that at any one given moment any strategy may be effective—perhaps because the person selects the strategy most appropriate for the current moment. Indeed, in our research, we saw that strategy selection was related to both the type and the strength of the desire. Over time, however, using certain types of strategies (such as situation selection or modification) more frequently may be more adaptive for longer term goal pursuit. This suggests that models of self-regulation such as the process model may need to be refined to distinguish between immediate effectiveness of strategy use and the consequences of prolonged or repeated use of certain strategies.

Our research is also the first to demonstrate the joint effectiveness of using multiple strategies, with more strategies leading to greater resistance. Past research (e.g., Duckworth, White, et al., 2016) has focused on comparing strategy use; however, it is likely the case that people use multiple strategies to combat a single instance of desire (see also Williamson & Wilkowski, 2020). Our findings that multiple strategies are effective, and that strategy use can be additive by combining strategies, suggests that effective self-control is a multifaceted process (for a similar argument regarding emotion regulation, see Ford et al., 2019; Grommisch et al., 2020). This view is consistent with recent process-oriented models in which multiple strategies can be used to achieve self-control, and is inconsistent with accounts in which self-control is defined more narrowly as willpower or inhibition (Baumeister, 2014). While we found that willpower/inhibition reduced desire enactment, this was only one of the multiple forms of self-control that we found to be effective. How people make these decisions (e.g., to use one vs. multiple strategies, or which strategies

TABLE 2 Likelihood of strategy use by type of desire (relative to all desires)

	Food/drink		Sleep/rest		Work/study		Media		Social		Leisure	
Strategy type	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Removal from situation	1.34	[.98; 1.83]	**.66**	**[.45; 97]**	.81	[.48; 1.37]	1.40	[.97; 2.01]	.94	[.50; 1.77]	1.22	[.69; 2.14]
Distraction	.87	[.68; 1.10]	.88	[.68; 1.14]	1.35	[.96; 1.92]	1.06	[.80; 1.41]	.98	[.62; 1.54]	1.18	[.79; 1.76]
Goal reminder	**.72**	**[.57; .91]**	**1.59**	**[1.27; 2.00]**	1.16	[.83; 1.63]	1.19	[.92; 1.53]	.87	[.57; 1.32]	**1.69**	**[1.16; 2.45]**
Promise to give in later	1.09	[.86; 1.37]	1.17	[.92; 1.48]	.76	[.52; 1.12]	.93	[.71; 1.23]	.69	[.43; 1.11]	**1.55**	**[1.05; 2.29]**
Reminder of why it was bad	**1.57**	**[1.20; 2.06]**	1.08	[.80; 1.44]	**.32**	**[.16; .61]**	.91	[.65; 1.26]	**1.86**	**[1.19; 2.90]**	1.12	[.69; 1.81]
Willpower	1.17	[.91; 1.51]	**1.42**	**[1.09; 1.85]**	**.48**	**[.30; .77]**	.87	[.63; 1.20]	1.21	[.76; 1.93]	.70	[.43; 1.15]
Other	1.07	[.66; 1.72]	**.29**	**[.14; .59]**	**2.17**	**[1.22; 3.85]**	.89	[.50; 1.60]	.75	[.29; 2.00]	1.24	[.54; 2.84]
None	1.03	[.70; 1.51]	**.63**	**[.41; .96]**	1.49	[.78; 2.85]	.76	[.48; 1.23]	1.37	[.74; 2.54]	.58	[.28; 1.20]
More than one	1.06	[.82; 1.36]	1.10	[.85; 1.43]	**.55**	**[.36; .84]**	1.04	[.77; 1.42]	1.21	[.76; 1.95]	1.39	[.91; 2.13]
Situation selection	.80	[.61; 1.03]	**1.75**	**[1.39; 2.21]**	**.24**	**[.15; .39]**	1.16	[.86; 1.56]	**1.78**	**[1.25; 2.51]**	1.42	[.92; 2.20]

Note: odds ratios represent the likelihood of using a strategy when that type of desire was reported (compared to average likelihood of strategy use across all desires). Numbers less than 1 represent a lower likelihood, and can be interpreted as OR/1, such that an OR of .65 means 2/3 as likely to use a strategy. Bold values represent a significant difference from 1 as indicated by a nonoverlap of the odds ratio CIs with 1.

TABLE 3 Strategy effectiveness across different type of desires

	Main effect of strategy use		Interaction terms											
			Food/Drink		Sleep/Rest		Work/Study		Media		Social		Leisure	
Strategy type	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Removal from situation	**2.17**	**[1.36; 3.46]**	1.38	[.68; 2.78]	.75	[.31; 1.77]	1.31	[.38; 4.51]	1.08	[.49; 2.38]	.81	[.21; 3.06]	**.15**	**[.04; .57]**
Distraction	**1.63**	**[1.19; 2.23]**	1.01	[.60; 1.72]	.69	[.40; 1.20]	1.30	[.56; 3.02]	.95	[.52; 1.74]	1.26	[.47; 3.33]	2.07	[.85; 5.06]
Goal reminder	**1.64**	**[1.21; 2.23]**	.94	[.56; 1.56]	1.32	[.81; 2.14]	**.25**	**[.10; .61]**	**.53**	**[.31; .93]**	1.73	[.72; 4.16]	**2.58**	**[1.15; 5.77]**
Promise to give in later	**1.42**	**[1.05; 1.93]**	.78	[.48; 1.28]	1.06	[.65; 1.74]	1.54	[.63; 3.74]	.66	[.37; 1.20]	1.28	[.47; 3.48]	.54	[.24; 1.19]
Reminder of why it was bad	**2.07**	**[1.31; 3.26]**	1.05	[.56; 1.98]	.73	[.37; 1.43]	.34	[.04; 2.55]	.59	[.28; 1.26]	2.32	[.87; 6.19]	.97	[.34; 2.81]
Willpower	**1.88**	**[1.28; 2.75]**	1.67	[.94; 2.95]	.92	[.52; 1.62]	.39	[.09; 1.64]	.96	[.48; 1.93]	.96	[.36; 2.54]	1.70	[.57; 5.07]
Multiple strategies	**2.71**	**[1.91; 3.82]**	1.27	[.76; 2.13]	1.08	[.63; 1.84]	.34	[.11; 1.02]	**.35**	**[.19; .65]**	**3.21**	**[1.18; 8.70]**	1.17	[.49; 2.75]

Note: odds ratios represent the likelihood of successfully resisting a desire (vs. giving in) when the strategy was used. Numbers less than 1 represent a lower likelihood, and can be interpreted as OR/1, such that an OR of .65 means 2/3 as likely to successfully resist, or 1.5 times more likely to give in (inverse of 2/3 is 3/2). The odds ratios for domains represent the odds of successfully resisting when using a strategy in that domain (compared to average successful resistance); with the exception of the bolded terms, all strategies were equally effective (based on main effect of strategy use) across types of desire.

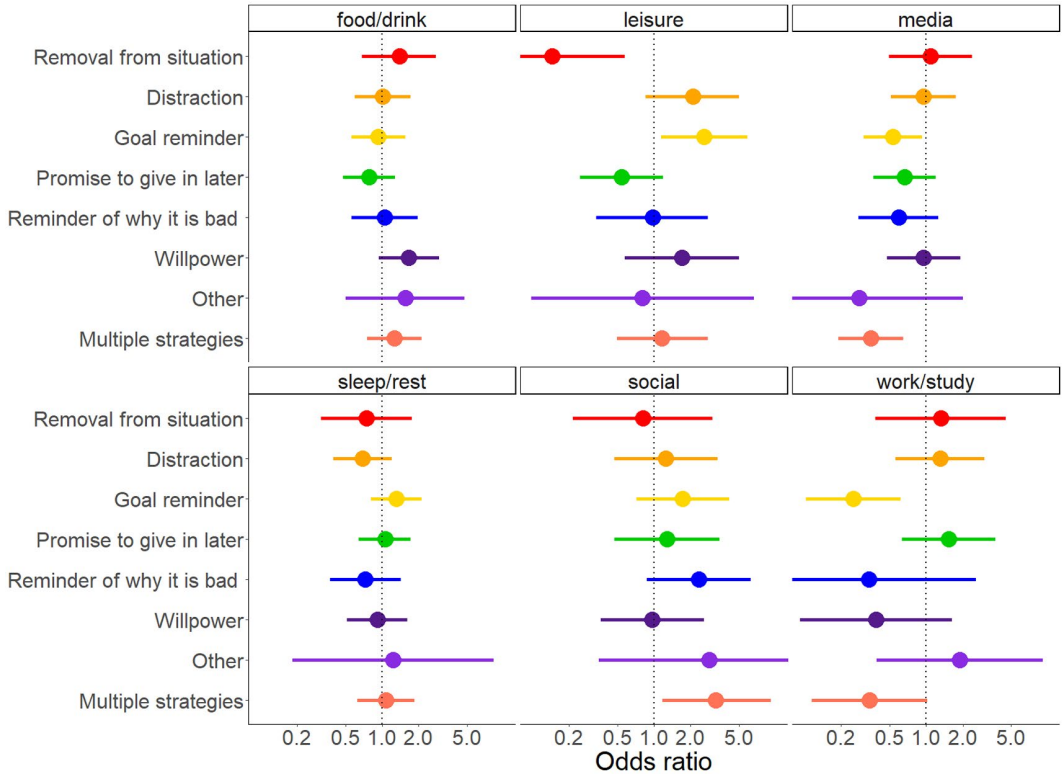

FIGURE 9 Odds ratio of strategy effectiveness for each type of desire. *Note*. The odds ratios for domains represent the odds of resisting the desire when using each strategy in that domain (compared to average desire resistance when using that strategy) [Color figure can be viewed at wileyonlinelibrary.com]

to combine together) is still largely unknown. Although it may be that people use more strategies when some strategies fail, it seems like using more strategies is associated with greater success, not failure. This may be important to consider when devising interventions to improve self-control in daily life—rather than asking individuals to implement one strategy (e.g., Duckworth, Gendler, et al., 2016), it may be more useful to provide them with a "toolbox" of strategies that they can flexible enact, likely using multiple strategies for any one instance of desire. However, to ensure that the most appropriate strategies or combinations are selected, a better understanding of the interactions between person and context in the effectiveness of strategy use would first be necessary.

In addition to examining effectiveness, we also found that strategy use was moderated by within-subject states and the goal context. First, participants were especially likely to remind themselves of their goals when they experienced particularly strong desires. This fits with the view of self-control as value-based choice (Berkman et al., 2017), which proposes that apparent self-control occurs when the value of acting in-line with a long-term goal (e.g., getting good grades) outweighs indulging in goal-incongruent actions (e.g., going to the cinema rather than studying). When the value of the desire is especially strong, deliberately focusing on the value of a goal may steer decision making in favor of the long-term goal and away from momentary desires as a means of achieving self-control. Similarly, Kotabe and Hofmann (2015) consider motivation as a key predictor of exerting self-control, needed to overpower a desire—boosting motivation by reminding oneself of an important goal can lead to greater resistance and self-regulatory success. No other differences were observed; this goes against prior research on emotion regulation, which found that people preferred disengagement-focused strategies (e.g., distraction) for strong rather than weak emotions (Sheppes et al., 2011, 2014). These findings suggest that the dynamics of self-control choice in the context of unwanted desires do not necessarily mirror those used to regulate intense emotion.

Another study on self-control strategies also found that desire strength did not influence strategy selection (Wenzel et al., 2016); they did not investigate focusing on goals as a strategy. They did, however, note an interaction between trait self-regulatory effectiveness (as assessed by the trait self-control scale) and desire strength. We did not investigate this possibility in the present paper, but the question of whether more effective self-regulators use different strategies in different contexts is an interesting one for future research.

We also found that different strategies are used in the context of different types of desire. For example, participants were less likely to remind themselves of their goals when

faced with a desire for food or drink, but more likely to do so when desiring rest or leisure. Conversely, they were more likely to remind themselves of why food/drink and social desires were bad, and less likely to do so for desires related to work/study—likely because the latter were not actually bad for them. Why do we find such differences in strategy use? Do people have general preferences or an intuitive sense of what works and does not work in certain situations? Conversely, strategy preferences might arise not because of perceived effectiveness but for other reasons, such as ease of use or feasibility. Perhaps, as with emotion regulation, a person's beliefs about their abilities to implement a specific strategy may influence its use (Gross, 2015b; Koole, 2009). Given that the actual effectiveness of these strategies was similar across the different types of desires, it may be that such intuitions or beliefs that people hold about desire effectiveness are incorrect. Or perhaps people actually selected strategies that were most effective for them/that they were able to implement, such that across all people, all strategies had similar effectiveness, but this was due to a flexible strategy choice. Additional research is needed to better understand how people decide on strategy use across different situations.

An additional contribution of our study is an examination of unattainable desires and of situation selection as a self-regulatory strategy. Past research on in-the-moment self-control (Hofmann, Baumeister, et al., 2012; Milyavskaya & Inzlicht, 2017) has not considered the possibility that some desires simply cannot be enacted. As such, not giving in to a desire is not necessarily a product of momentary self-control (although it could be due to pre-emptive self-regulation). In our study, however, we find that approximately a third of the time (33%), people are experiencing desires that they have no opportunity to satisfy. This supports Kotabe and Hofmann's (2015) proposition that enactment constraints can ultimately dictate the outcome of self-regulatory conflicts. However, to date, there was no estimate of how frequently this actually occurs in real-life self-control contexts.

Additionally, we find that in 27% of cases where participants reported that an opportunity was not present, the constraint was there by design, to prevent the enactment of a desire. This can be considered an instance of situation selection—setting up your environment in such a way that bolsters self-control (Duckworth, Gendler, et al., 2016)—that has not previously been empirically examined in people's daily lives. We found that situation selection was successfully used to resist almost 10% of all reported desires. Additionally, it is likely that our methodology missed many instances of successful situation selection, when participants did not even experience a desire because they have eliminated the antecedent events that would prompt the desire in the first place. We also did not assess unsuccessful situation selection (i.e., when participants tried to use this strategy, but it failed). Future studies are needed to better understand the use of this strategy in daily life.

The present study also includes one strategy that is less frequently examined in the self-regulation literature: postponing a desire until later (Mead & Patrick, 2016). Prior research found such postponement can be effective when the delay is not specified because it signals lower value for the temptation (i.e., If I'm willing to do it later but have no specific plans to do it, I must not want it that much; Mead & Patrick, 2016). In our research, this strategy was more likely to be used for particularly stronger desires and for desires related to leisure, but was perhaps slightly less effective than other strategies (although still more effective than not using it at all). However, our wording of the item ("I promise to give in later") made it unclear whether the participants had specific plans of when to give into the temptation; a better understanding of the type of postponement could help us better understand the effectiveness of this strategy. Additionally, the idea of postponement also hints at another aspect of resisting desires that we largely ignored in this research: that desires are not necessarily bad, and that balancing hedonic desires with long-term goals is important for well-being (Huta & Ryan, 2010). That is, postponing a desire until later (and giving in then) may indeed be the most adaptive strategy because it allows for greater balance. Future research needs to look past the assumption that desires are "bad" (Milyavskaya et al., 2019) to investigate how people balance their immediate hedonic desires with the pursuit of longer term goals.

The present study focused on six different strategies used to resist desires. These strategies are not an exhaustive list of all strategies that can be used. For example, Hennecke et al., (2019) reported many other strategies, including task enrichment, seeking social support, and self-talk (see also Furman et al., 2020), along with others that we did not examine. We also focused on strategies that are used on the moment, rather than broader strategies enacted to reduce self-control failure (Duckworth et al., 2018). Indeed, we only examined in-the-moment desires that would have elicited inhibitory self-control (stopping yourself from doing something), choosing to focus on the strategies that are used to stop desire enactment. Other, different strategies could be useful for enacting initiatory self-control (i.e., starting something; see de Ridder et al., 2011, for distinction), or for persistence (Hennecke et al., 2019). Future research should continue to examine strategies used in such situations to better understand strategy effectiveness, so that these can be incorporated into an intervention "toolbox."

4.1 | Limitations

One important caveat of our study is that we looked at desires broadly, and not just at temptations, which are desires that conflict with personal goals. As such, many of these desires may not be inherently problematic. Note, however, that the strategies items were only asked when participants reported trying at least somewhat to resist, suggesting that the desire

was at least somewhat problematic (why would anyone try to resist an unproblematic desire). Future research can examine whether people use different strategies for more (vs. less) problematic desires, or for desires that conflict especially strongly with some specific goals.

Other limitations include our reliance on participants' awareness of both their desires and their own strategy use. Desires, of course, can be unconscious (Hofmann & Van Dillen, 2012). It is thus likely that in many cases participants gave into or a desire or used a strategy to resist a desire without realizing they were doing so. Our experience sampling method is thus only limited to desires that people can consciously report. However, the simple act of asking participants to consistently reflect on the presence of desires might lead them to be more sensitive/attentive to experiences of potential desires, thereby artificially overestimating their conscious experiences of desire. Similarly, participants were expected to be aware of the strategies they actually used; it is not known, however, to what extent people are actually aware of their own strategy use. For example, a person may switch their attention from a desired food without being aware they are doing so. Additionally, the strategy of "I just used willpower" may have meant different things to different participants, and may have included other types of strategies (e.g., cognitive change) that lay people interpret as willpower. Furthermore, asking participants to pay attention to the strategies they were using may have raised awareness about the existence and possible utility of these strategies, and led them to behave in a different way from how they typically act. This is a general limitation of the experience sampling method—it is currently unknown to what extent repeatedly assessing some construct of interest actually changes participants' awareness or behaviors. Multimethod studies that do not rely on participant reports are needed to provide converging evidence for the findings reported in this paper.

Finally, the questions about the opportunity to satisfy the desire was presented as a binary (y/n) choice, and in some cases the distinction may not be so clear cut. For example, if I am really sleepy, but am sitting in an important meeting, I may say that I do not have the opportunity to resist the desire to sleep, even though in reality it would be possible (but highly undesirable) for me to close my eyes and fall asleep in the middle of the meeting. That is, the question about opportunities may have blurred the lines distinguishing what was physically impossible from merely very difficult/inappropriate; the latter would still be considered an environmental constraint, even though it does not make it impossible but simply highly unlikely that the desire is satisfied.

4.2 | Conclusions

As the first study to investigate the use of strategies for resisting in-the-moment desires, this research adds to the fledging research on self-regulatory strategies. In contrast to the process model of self-control that predicts that strategies employed earlier in the impulse generation cycle will be more effective, we find that many strategies are similarly effective. Importantly, we also show that using multiple strategies is especially effective. A lot more research is needed, however, to better understand how people decide to use a particular strategy, and when these strategies are especially effective for successful self-control. Additionally, new/adapted theories are needed that can account for which strategies are more likely to be successful. Such theories may need to be more complex, considering characteristics of the desire, constraints of the situation, and individual differences.

ACKNOWLEDGMENTS

We would like to thank the Toronto Laboratory for Social Neuroscience lab manager, Veerpal Bambrah, for her assistance with this study.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID

Marina Milyavskaya https://orcid.org/0000-0002-0510-4891
Michael Inzlicht https://orcid.org/0000-0001-9297-6497

ENDNOTES

[1] Given that the study began before Duckworth, Gendler, et al. (2016) process model of self-control was published, we did not explicitly select strategies from the process model. Nevertheless, the strategies used in the present study fit within the model: ***removing yourself from the situation*** is an instance of situation modification; ***distraction*** is an example of attentional deployment; ***reminding yourself of why the desire was bad***, ***reminding yourself about your goal***, and ***promising to give in later*** all representing instances of cognitive change/reappraisal (thinking differently about the desire or the competing goal), and ***simply using willpower*** represents a lay-person view of response inhibition.

[2] Initially, we planned to write one paper answering two research questions—one about strategy use and the second about brain predictors of real-life self-control. Upon reflection, we re-considered our initial decision, deeming the two questions too different, and thus better addressed with separate manuscripts.

[3] As part of the larger data collection, we also collected data from a nightly survey sent at 10:15 p.m. each day of the experience sampling portion of the study, as well as follow-up surveys one month, three months, 6 months, and 12 months after the initial in-lab visit. These questionnaires were included to answer questions beyond the scope of this paper and will not be discussed further.

[4] Participants who gave into their desire also reported on why they gave in (i.e., the justifications); in our preregistration we said that we would report on this, but upon further reflection it did not fit within this manuscript, so we did not analyse these data.

[5] In our preregistration we mistakenly indicated that we will "correlate desire with strategy use"; however, since strategy use is binomial, logistic regression is more appropriate.

[6] Note that tables report unit-level results, while figures are based on the population-level probabilities.

REFERENCES

Aiken, L. S., West, S. G., Pitts, S. C., Baraldi, A. N., & Wurpts, I. C. (2012). Multiple linear regression. In I. B. Weiner, J. A. Schinka, & W. F. Velicer (Eds.), *Handbook of psychology*. Research Methods in Psychology (2nd ed., Vol. *2*, pp. 511–542). Wiley.

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*(1), 1–48. https://doi.org/10.18637/jss.v067.i01

Baumeister, R. F. (2014). Self-regulation, ego depletion, and inhibition. *Neuropsychologia*, *65*, 313–319. https://doi.org/10.1016/j.neuropsychologia.2014.08.012

Berkman, E. T., Hutcherson, C. A., Livingston, J. L., Kahn, L. E., & Inzlicht, M. (2017). Self-control as value-based choice. *Current Directions in Psychological Science*, *26*(5), 422–428. https://doi.org/10.1177/0963721417704394

Bernheim, B. D., & Rangel, A. (2004). Addiction and cue-triggered decision processes. *American Economic Review*, *94*(5), 1558–1590. https://doi.org/10.1257/0002828043052222

Bucher, T., Collins, C., Rollo, M. E., McCaffrey, T. A., De Vlieger, N., Van der Bend, D., Truby, H., & Perez-Cueto, F. J. A. (2016). Nudging consumers towards healthier choices: A systematic review of positional influences on food choice. *British Journal of Nutrition*, *115*(12), 2252–2263. https://doi.org/10.1017/S0007114516001653

de Ridder, D. T., de Boer, B. J., Lugtig, P., Bakker, A. B., & van Hooft, E. A. (2011). Not doing bad things is not equivalent to doing the right thing: Distinguishing between inhibitory and initiatory self-control. *Personality and Individual Differences*, *50*(7), 1006–1011. https://doi.org/10.1016/j.paid.2011.01.015

Duckworth, A. L., Gendler, T. S., & Gross, J. J. (2016). Situational strategies for self-control. *Perspectives on Psychological Science*, *11*(1), 35–55. https://doi.org/10.1177/1745691615623247

Duckworth, A. L., Milkman, K. L., & Laibson, D. (2018). Beyond willpower: Strategies for reducing failures of self-control. *Psychological Science in the Public Interest*, *19*(3), 102–129. https://doi.org/10.1177/1529100618821893

Duckworth, A. L., White, R. E., Matteucci, A. J., Shearer, A., & Gross, J. J. (2016). A stitch in time: Strategic self-control in high school and college students. *Journal of Educational Psychology*, *108*(3), 329–341. https://doi.org/10.1037/edu0000062

English, T., Lee, I. A., John, O. P., & Gross, J. J. (2017). Emotion regulation strategy selection in daily life: The role of social context and goals. *Motivation and Emotion*, *41*(2), 230–242. https://doi.org/10.1007/s11031-016-9597-z

Epley, N., Mak, D., & Idson, L. C. (2006). Bonus of rebate? The impact of income framing in spending and saving. *Journal of Behavioral Decision Making*, *19*, 213–227.

Farabee, D., Rawson, R., & McCann, M. (2002). Adoption of drug avoidance activities among patients in contingency management and cognitive-behavioral treatments. *Journal of Substance Abuse Treatment*, *23*(4), 343–350. https://doi.org/10.1016/S0740-5472(02)00297-0

Ford, B. Q., Gross, J. J., & Gruber, J. (2019). Broadening our field of view: The role of emotion polyregulation. *Emotion Review*, *11*(3), 197–208. https://doi.org/10.1177/1754073919850314

Fujita, K. (2011). On conceptualizing self-control as more than the effortful inhibition of impulses. *Personality and Social Psychology Review*, *15*(4), 352–366. https://doi.org/10.1177/1088868311411165

Furman, C. R., Kross, E., & Gearhardt, A. N. (2020). Distanced self-talk enhances goal pursuit to eat healthier. *Clinical Psychological Science*, *8*(2), 366–373. https://doi.org/10.1177/2167702619896366

Gillebaart, M. (2018). The 'operational' definition of self-control. *Frontiers in Psychology*, *9*, 1231.

Gillebaart, M., & de Ridder, D. T. (2015). Effortless self-control: A novel perspective on response conflict strategies in trait self-control. *Social and Personality Psychology Compass*, *9*(2), 88–99. https://doi.org/10.1111/spc3.12160

Giuliani, N. R., Calcott, R. D., & Berkman, E. T. (2013). Piece of cake. Cognitive reappraisal of food craving. *Appetite*, *64*, 56–61. https://doi.org/10.1016/j.appet.2012.12.020

Grommisch, G., Koval, P., Hinton, J. D. X., Gleeson, J., Hollenstein, T., Kuppens, P., & Lischetzke, T. (2020). Modeling individual differences in emotion regulation repertoire in daily life with multilevel latent profile analysis. *Emotion*, *20*(8), 1462–1474.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, *2*(3), 271–299. https://doi.org/10.1037/1089-2680.2.3.271

Gross, J. J. (2001). Emotion regulation in adulthood: Timing is everything. *Current Directions in Psychological Science*, *10*(6), 214–219. https://doi.org/10.1111/1467-8721.00152

Gross, J. J. (2015a). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, *26*(1), 1–26.

Gross, J. J. (2015b). The extended process model of emotion regulation: Elaborations, applications, and future directions. *Psychological Inquiry*, *26*(1), 130–137. https://doi.org/10.1080/1047840X.2015.989751

Heiy, J. E., & Cheavens, J. S. (2014). Back to basics: A naturalistic assessment of the experience and regulation of emotion. *Emotion*, *14*(5), 878–891.

Hennecke, M., Czikmantori, T., & Brandstätter, V. (2019). Doing despite disliking: Self-regulatory strategies in everyday aversive activities. *European Journal of Personality*, *33*(1), 104–128.

Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. *Journal of Personality and Social Psychology*, *102*(6), 1318–1335. https://doi.org/10.1037/a0026545

Hofmann, W., & Patel, P. V. (2015). SurveySignal: A convenient solution for experience sampling research using participants' own smartphones. *Social Science Computer Review*, *33*(2), 235–253. https://doi.org/10.1177/0894439314525117

Hofmann, W., & Van Dillen, L. (2012). Desire: The new hot spot in self-control research. *Current Directions in Psychological Science*, *21*(5), 317–322. https://doi.org/10.1177/0963721412453587

Hofmann, W., Vohs, K. D., & Baumeister, R. F. (2012). What people desire, feel conflicted about, and try to resist in everyday life. *Psychological Science*, *23*(6), 582–588. https://doi.org/10.1177/0956797612437426

Huta, V., & Ryan, R. M. (2010). Pursuing pleasure or virtue: The differential and overlapping well-being benefits of hedonic and eudaimonic motives. *Journal of Happiness Studies*, *11*(6), 735–762. https://doi.org/10.1007/s10902-009-9171-4

Koole, S. L. (2009). The psychology of emotion regulation: An integrative review. *Cognition and Emotion*, *23*(1), 4–41. https://doi.org/10.1080/02699930802619031

Kotabe, H. P., & Hofmann, W. (2015). On integrating the components of self-control. *Perspectives on Psychological Science*, *10*(5), 618–638. https://doi.org/10.1177/1745691615593382

Mead, N. L., & Patrick, V. M. (2016). The taming of desire: Unspecific postponement reduces desire for and consumption of postponed temptations. *Journal of Personality and Social Psychology*, *110*(1), 20–35. https://doi.org/10.1037/a0039946

Millgram, Y., Sheppes, G., Kalokerinos, E., Kuppens, P., & Tamir, M. (2019). Do the ends dictate the means in emotion regulation? *Journal of Experimental Psychology: General*, *148*(1), 80–96. https://doi.org/10.1037/xge0000477

Milyavskaya, M., Berkman, E. T., & De Ridder, D. T. (2019). The many faces of self-control: Tacit assumptions and recommendations to deal with them. *Motivation Science*, *5*(1), 79–85. https://doi.org/10.1037/mot0000108

Milyavskaya, M., & Inzlicht, M. (2017). What's so great about self-control? Examining the importance of effortful self-control and temptation in predicting real-life depletion and goal attainment. *Social Psychological and Personality Science*, *8*(6), 603–611. https://doi.org/10.1177/1948550616679237

Mischel, W., Ebbesen, E. B., & Raskoff Zeiss, A. (1972). Cognitive and attentional mechanisms in delay of gratification. *Journal of Personality and Social Psychology*, *21*(2), 204–218. https://doi.org/10.1037/h0032198

Mischel, W., & Rodríguez, M. L. (1993). Psychological distance in self-imposed delay of gratification. In R. R. Cocking, & K. A. Renninger (Eds.), *The development and meaning of psychological distance* (pp. 109–121). Lawrence Erlbaum Associates, Inc.

Nielsen, K. S., Gwozdz, W., & De Ridder, D. (2019). Unravelling the relationship between trait self-control and subjective well-being: The mediating role of four self-control strategies. *Frontiers in Psychology*, *10*, 706.

Roberts, N. A., Levenson, R. W., & Gross, J. J. (2008). Cardiovascular costs of emotion suppression cross ethnic lines. *International Journal of Psychophysiology*, *70*, 82–87. https://doi.org/10.1016/j.ijpsycho.2008.06.003

Rogers, T., Milkman, K. L., & Volpp, K. G. (2014). Commitment devices: Using initiatives to change behavior. *Journal of the American Medical Association*, *311*, 2065–2066. https://doi.org/10.1001/jama.2014.3485

Sheppes, G., & Gross, J. J. (2011). Is timing everything? Temporal considerations in emotion regulation. *Personality and Social Psychology Review*, *15*(4), 319–331. https://doi.org/10.1177/1088868310395778

Sheppes, G., Scheibe, S., Suri, G., & Gross, J. J. (2011). Emotion-regulation choice. *Psychological Science*, *22*(11), 1391–1396. https://doi.org/10.1177/0956797611418350

Sheppes, G., Scheibe, S., Suri, G., Radu, P., Blechert, J., & Gross, J. J. (2014). Emotion regulation choice: A conceptual framework and supporting evidence. *Journal of Experimental Psychology: General*, *143*(1), 163–181. https://doi.org/10.1037/a0030831

Suri, G., Sheppes, G., Young, G., Abraham, D., McRae, K., & Gross, J. J. (2018). Emotion regulation choice: The role of environmental affordances. *Cognition and Emotion*, *32*(5), 963–971. https://doi.org/10.1080/02699931.2017.1371003

Thaler, R. H., & Shefrin, H. M. (1981). An economic theory of self-control. *Journal of Political Economy*, *89*(2), 193–205. https://doi.org/10.1086/260971

Tice, D. M., & Bratslavsky, E. (2000). Giving in to feel good: The place of emotion regulation in the context of general self-control. *Psychological Inquiry*, *11*(3), 149–159. https://doi.org/10.1207/S15327965PLI1103_03

Vohs, K. D., & Baumeister, R. F. (2004). Understanding self-regulation. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 1–12). The Guilford Press.

Wegner, D. M. (1989). *White bears and other unwanted thoughts: Suppression, obsession, and the psychology of mental control*. Penguin Press.

Wenzel, M., Kubiak, T., & Conner, T. S. (2016). Self-control in daily life: How affect may boost or sabotage efforts at self-control. *Social Psychological and Personality Science*, *7*(3), 195–203. https://doi.org/10.1177/1948550616632578

Wilkowski, B. M., Ferguson, E. L., Williamson, L. Z., & Lappi, S. K. (2018). (How) does initial self-control undermine later self-control in daily life? *Personality and Social Psychology Bulletin*, *44*(9), 1315–1329. https://doi.org/10.1177/0146167218766857

Williamson, L. Z., & Wilkowski, B. M. (2020). Nipping temptation in the bud: Examining strategic self-control in daily life. *Personality and Social Psychology Bulletin*, *46*, 961–975. https://doi.org/10.1177/0146167219883606

Wyland, C. L., Kelley, W. M., Macrae, C. N., Gordon, H. L., & Heatherton, T. F. (2003). Neural correlates of thought suppression. *Neuropsychologia*, *41*, 1863–1867. https://doi.org/10.1016/j.neuropsychologia.2003.08.001

How to cite this article: Milyavskaya M, Saunders B, Inzlicht M. Self-control in daily life: Prevalence and effectiveness of diverse self-control strategies. *J Pers*. 2021;89:634–651. https://doi.org/10.1111/jopy.12604