Review

Believe in your self-control: Lay theories of self-control and their downstream effects

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Self-control is the ability to inhibit temptations and persist in one's decisions about what to do. In this article, we review recent evidence that suggests implicit beliefs about the process of self-control influence how the process operates. While earlier work focused on the moderating influence of willpower beliefs on depletion effects, we survey new directions in the field that emphasize how beliefs about the nature of self-control, self-control strategies, and their effectiveness have effects on downstream regulation and judgment. These new directions highlight the need to better understand the role of self-control beliefs in naturalistic decision-making.

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In the 18th century, there was widespread disagreement about how digestion worked: some experts advocated for fermentation, others for putrefaction, others for convection [1]. Here's a bet we would make: digestion worked the same way regardless of one's digestive theories. So too with most physical organic processes: personal beliefs make no difference to how they work. The same cannot be said for all psychological processes. Recent research suggests that beliefs about how a process works—one's *lay theory* of the process—can affect how that process operates. This effect has been found for phenomena including self-regulation [2], compassion [3], and the malleability of traits and dispositions [4]. This review discusses how lay theories of self-control affect its functioning.

Across different experiments, self-control seems to operate differently depending on one's beliefs about it. For example, work by Job and colleagues suggests that those who believe that willpower draws on limited resources appear more prone to fatigue during self-control tasks compared to those who believe willpower resources are unlimited [5]. In this paper we will review work suggesting the more general phenomenon that people's beliefs about *what counts as self-control* and about *how moral or immoral one's goals are* affects which self-control strategies one thinks about and tends to prefer, and point to promising directions for future research.

Straightaway, we should distinguish two phenomena. It would be unsurprising to find that beliefs about one's dancing skills influence dancing behaviors. The phenomenon we discuss below is importantly different: rather than a 'self-fulfilling prophecy' about one's abilities, the beliefs we focus on concern the nature of the process. Thus, the distinction turns on whether beliefs about what self-control *is*—rather than beliefs about *how good* one is at self-control—affect how self-control operates.

Lay self-control beliefs and ego-depletion

Initial research examined whether implicit beliefs about the *limited* nature of willpower moderated the degree to which performing an initial self-control task impaired performance on a subsequent self-control task. In the seminal study [5], researchers found that manipulating willpower beliefs intensified or diminished this 'ego-depletion' effect. Follow-up studies suggested individuals who believe willpower is non-limited do not exhibit ego-depletion [6,7] and that non-limited willpower beliefs are even associated with pro-environmental behaviors [8], use of cognitive learning strategies prior to exams [9], regulation of study behaviors [10], greater sustained learning in a difficult cognitive task [11] and offering more emotional support to a relational partner [12], to name a few.

Important questions remain about this line of research. Several attempts to replicate the original moderation finding have failed [13−16], including a preregistered replication [17], or found evidence for the *opposite* hypothesis, namely that non-limited willpower beliefs were associated with greater ego-depletion [18−20]. More broadly, the moderation effect assumes the ego-depletion effect, although recent meta-analyses report conflicting evidence for its existence, with some finding a small but significant effect [21] and others finding evidence that there is no ego-depletion effect [22]. If there is no solid evidence for ego-depletion effects [23], this may cast doubt on potential moderators. (Compare with [24] to assess the strength of arguments.)

Interpreting the effects of limited willpower beliefs on behavior thus requires caution. In the rest of this review, we focus on novel sources of evidence about effects of self-control beliefs unrelated to willpower limitations and to ego-depletion effects.

The lay theory of self-control

We will first summarize findings about the *lay theory* of self-control: the set of non-expert beliefs about what self-control is, what its boundaries are (e.g., whether it is distinct from other forms of self-regulation), and what types of self-control exist.

Experts agree that self-control includes *synchronic regulation*, the effortful resistance of an occurrent motivation; but they disagree about whether it also includes *diachronic regulation*, the management of foreseen but not presently felt motivations. (These are sometimes called *reactive* and *proactive* self-control [25] or *preventive* and *interventive* self-control [26]). Since diachronic regulation can be effortless [27,28], admitting it as a form of self-control would unlink self-control and effort. Those who believe self-control requires effort tend to restrict the concept to synchronic regulation [29,30]. Where does lay theory land?

A challenge to answering this question is that intuitions are often contaminated: in many cases of diachronic regulation agents *also* use synchronic regulation [30]. Imagine a person committed to reducing social media use who deletes apps from their phone to avoid future temptations. This is diachronic regulation, but the act of deleting the apps may also require in-the-moment control, and continue to require it to avoid re-installing those apps.

Irving et al. [31] developed a method to decontaminate intuitions. In a series of vignette studies, each participant saw a version of a story where an agent faced with a (present or future) temptation exerted both synchronic and diachronic regulation, just one but not the other, or none at all. The results of four pre-registered studies consistently suggested that only synchronic regulation drives self-control attributions. People classify instances of diachronic regulation as self-control only when they are accompanied by synchronic regulation. This shows that self-control is restricted to synchronic regulation according to the lay theory.

Multiple strategies are available for synchronic regulation. The process model of self-control [32] distinguishes between *intrapsychic strategies* like direct impulse suppression, attention control, and cognitive reappraisal, which operate only on psychological resources internal to the agent; and *situational strategies*, which rely on transforming the agent's environment by restructuring it (e.g., hiding treats) or changing location (e.g. leaving a bar so as to avoid drinking). Notice that 'direct impulse suppression' does not refer to the *goal* of inhibiting a given behavior (which is a goal shared by many strategies), but to the basic psychological *process* of refraining from manifesting an impulse in behavior [33].

The intrapsychic/situational distinction is distinct from the synchronic/diachronic one. One can use situational strategies synchronically (I am at the bar and tempted to drink, so I decide to leave), or use intrapsychic strategies diachronically (I know I will be tempted to eat too much cake later, so I preventively reconceptualize it as a disgusting calorie bomb). It is thus worth considering whether the lay theory includes both situational and intrapsychic strategies as forms of self-control.

Bermúdez et al. [34] found that, while people classify both intrapsychic and situational strategies as instances of self-control, intrapsychic strategies are seen as central and situational strategies as peripheral. In a pre-registered vignette study, fictional agents using purely intrapsychic strategies were rated as displaying more self-control than those using environmental scaffolds. In a subsequent pre-registered open-response study, participants were asked to generate three self-control strategies that a person experiencing a motivational conflict could use. Intrapsychic strategies were almost three times more frequent and more salient than situational strategies. They also were more likely to be recommended and rated as more effective. This suggests that intrapsychic strategies are *prototypical* in lay thinking: they tend to be seen as better and more representative instances of self-control.

One can then ask whether any particular strategy is more central than all others. In five studies Gennara et al. [35] found that fictional characters using 'pure willpower' (i.e., direct impulse suppression) were rated as higher in self-control than those using any other strategy. They also found that people differ in their strategy beliefs, and that these differences affect self-control attributions: people who believe that non-suppression strategies are indicative of high self-

control tend to attribute equal degrees of self-control to characters using suppression and non-suppression strategies.

Collectively, these studies reveal a consistent picture of lay self-control as a hierarchical concept with clear boundaries and distinct layers: (1) 'self-control' refers only to synchronic regulation; (2) situational strategies are more peripheral than intrapsychic ones; and (3) among all strategies, direct impulse suppression is the most central of all (Figure 1).

Crucially, evidence is emerging that this lay theory affects how people make decisions in practice. Those who believe that non-willpower strategies are more indicative of self-control were more likely to report intentions to use diverse strategies during the next week [35]. Importantly, this suggests that the lay theory's hierarchical nature can bias people towards privileging pure impulse suppression strategies in their everyday regulation attempts. This is worrisome given that strategy flexibility seems to increase regulatory success [36].

But there is good news, too: Gennara and colleagues manipulated lay strategy beliefs (by having participants read articles that promote either strategic self-control or direct impulse suppression), and this led to changes in self-control judgments and intentions to use multiple

Figure 1

The lay theory of self-control. Layperson self-control attributions are limited to synchronic regulation, and strategies are hierarchically organized, with direct impulse suppression being the most central, followed by other intrapsychic strategies, and situational strategies being the most peripheral.

strategies [35]. This underscores the importance of further investigating how shifts in lay beliefs can change strategy use, since they can impact behavior.
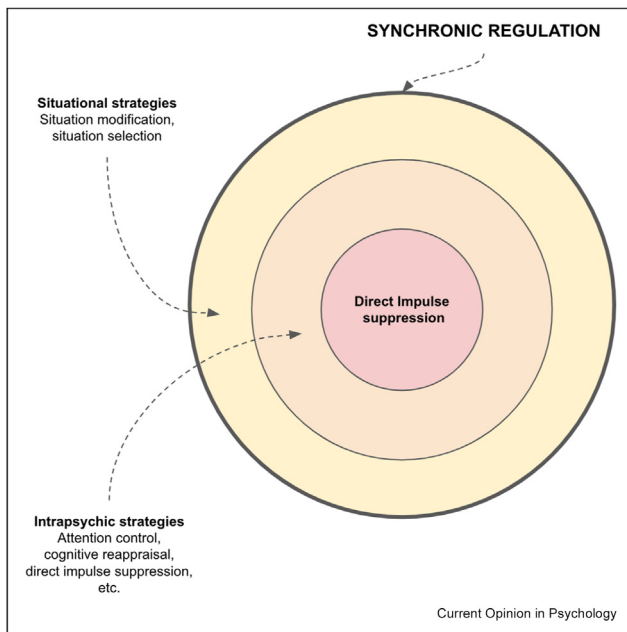
Lay self-control judgments and morality

Besides beliefs about self-control's nature, beliefs about morality also seem to have effects on further self-control processes: people tend to attribute less self-control to those with immoral commitments compared to those with moral commitments, regardless of whether they successfully resist temptations [34,37–40], perhaps because they implicitly view immoral commitments as self-control failures or because they presuppose a deeper moral commitment in the agent (see below and [37,40]). Strategy choice is also affected: Bermúdez et al. [34] found that participants suggested more internal strategies (e.g., attentional focus or cognitive reappraisal) for managing temptation related to *moral* commitments and more external strategies (e.g., situation modification or attentional distraction) for managing temptation related to *immoral* commitments.

In subsequent pre-registered studies, Murray and colleagues [41] tested the effect of goal moralization on choosing between attentional focus and attentional distraction strategies. Participants were presented with descriptions of agents tempted to abandon commitments that varied in moral valence, and were asked whether attentional distraction or attentional focus strategies would be more effective. Participants predominantly selected focus strategies for moral commitments, and the probability of selecting a focus strategy increased significantly as a function of goal moralization. These studies were limited to selecting between attentional self-control strategies in hypothetical situations, but the results suggest that the goal's perceived moral valence alters how people think about self-control strategy effectiveness.

The effect of moralization might stem from the agent's perceived identification with their commitments. From a 'true self' perspective, people may identify with, and hence wholeheartedly pursue, moral goals, whereas immoral goals are seen as more peripheral to identity and so individuals exhibit double-mindedness in pursuing them [42]. Murray et al. [41] found that perceived identification between the agent and their goal mediated the effect of moral valence on strategy selection. This suggests that identification mediates morality's influence on people's thinking about self-control strategy effectiveness. Note that this is not a case of morality affecting the availability of self-control or one's beliefs about how much self-control one has; rather, differences in moral beliefs were associated with differences in the effectiveness of different strategies for a given goal.
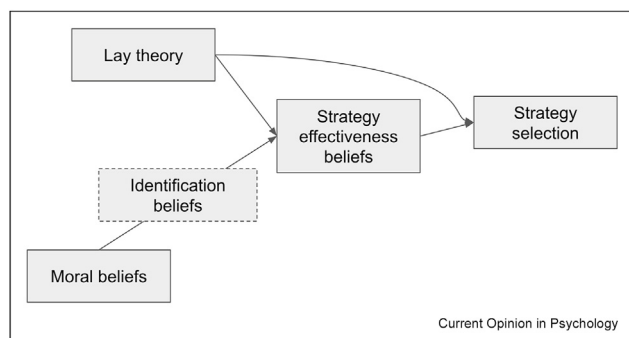
Looking ahead

Evidence suggests that, unlike digestion, what one believes about self-control changes how it operates. Early research focused on the effect of believing that self-control was limited or non-limited. A more expansive approach has recently emerged encompassing beliefs about the nature of self-control and the effects of morality on beliefs about self-control strategy effectiveness and intentions to implement them (Figure 2).

Future work could address many of the limitations of this promising research program. The studies mentioned above rely mainly on judgments about hypothetical scenarios involving third-party actors. While we are skeptical that the actor/observer bias runs very deep (see Ref. [43]), there is a further concern that hypothetical and naturalistic self-control decision-making might diverge. Many commitments also unfold over long stretches of time, such that naturalistic self-control decision-making might draw on combinations of strategies [44]. Paradigms currently used to study everyday self-control exercises [45,46] could easily be adapted to include measures of implicit beliefs about strategy effectiveness, recognition of intrapsychic or situational strategies, and so on.

To highlight potential uses of the framework proposed above, we apply it to a recent study conducted on relationships and implicit self-control beliefs. Francis and colleagues [12] collected responses from couples about whether they offered or received instrumental or emotional support from their partner over a two-week period. Each survey was completed at the end of the day. Francis et al. also measured willpower beliefs, attachment style, relationship satisfaction, and demographic variables. They initially found that limited-willpower beliefs predicted providing emotional and instrumental support to one's partner, but this partial effect was not statistically significant in the full model. Instead of only measuring implicit beliefs about willpower limitations, beliefs about strategy effectiveness and intentions to use different strategies might provide a richer picture of the role of implicit theory on offering relational support. Future work could examine whether people who rely mostly on direct impulse suppression (vs. more flexible strategy use) are less likely to offer relational support. Work like this would be illuminating particularly given research suggesting that situational self-control strategies can be more successful in some contexts [32,47,48].

Thus, the study of self-control beliefs should expand beyond testing implicit limited-willpower beliefs to examining the full range of beliefs about self-control strategies and their effectiveness. To that end, we recommend shifting toward understanding how different aspects of the lay theory of self-control modulates its deployment.

CRediT author statement

Juan Pablo Bermúdez: Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing, Visualization, Funding acquisition. **Samuel Murray**: Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

Figure 2

The emerging framework of the effect of lay beliefs on self-control processes. (1) Lay theories affect perceptions of strategy effectiveness and subsequent intentions to use strategies. (2) Moral beliefs, i.e. beliefs about the moral character of the agent's goals, affect strategy effectiveness, which in turn may affect strategy selection. (3) The effect of moral beliefs about goals on self-control strategy beliefs may be mediated by the person's level of identification with the goal, with moral beliefs tending to be more closely identified with the agent's true self than immoral goals.

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* of special interest
** of outstanding interest

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Further information on references of particular interest

5. This seminal paper validated a measure of beliefs about whether
* willpower is a limited or unlimited resource. Using correlational and experimental techniques, the authors reported that willpower beliefs moderate the ego-depletion effect, with those holding resource-limited views experiencing greater exhaustion and making more mistakes on self-control tasks performed after a depleting task.

(Interpretation of this moderation effect would depend on whether ego-depletion exists).

12. A two-week experience-sampling study of the association between
* implicit beliefs about willpower being resource-limited and offering relational support. Across a two-week period, resource-limited willpower beliefs predicted offering less emotional and instrumental support to a close romantic partner.

17. An informative discussion of some methodological and statistical
** problems with several studies that examine the moderating influence of implicit willpower beliefs on the ego depletion effect. The authors claim that preregistered studies have failed to corroborate the original moderation finding and that among the studies that have corroborated the original moderation finding, many of these were severely underpowered.

31. By manipulating story scenarios, researchers found that people
** exclusively attribute self-control to immediate actions resisting temptation (synchronic regulation), disregarding planned avoidance strategies (diachronic regulation) unless accompanied by immediate resistance.

34. Through prototype studies of the concept, the paper identifies a
** hierarchical structure to lay theories of self-control. Intrapsychic strategies, such as direct impulse suppression and cognitive reappraisal, are considered more prototypical of self-control than situational strategies, such situation modification and selection. Accordingly, people view intrapsychic strategies as more effective and recommend them more often to manage temptation.

35. Five experiments show that people attribute more self-control to
** individuals described as using direct impulse suppression compared to those who use self-control strategies. Participants who read a short article about self-control strategies showed less of a difference in self-control attribution compared to those who read about willpower. This suggests that more information about self-control strategies might correct intrapsychic biases in self-control attribution.

41. The authors found that people tend to recommend attentional
** focus strategies to manage temptations related to moral commitments and attentional distraction strategies to manage temptations related to immoral commitments. The effect of moralization on strategy selection is mediated by the perceived identification between the agent and their commitment.

44. This 7-day experience-sampling study examines self-control stra-
* tegies used in everyday life. Individual strategies did not differ in terms of their efficacy, but using multiple strategies was associated with a higher likelihood of success compared to single-strategy approaches. In exploratory analyses, the authors find some evidence that the type of tempting desire experience alters what strategy people tend to deploy.