

Emotion regulation and self-control: Same same but different... and even incompatible?

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Abstract

Objective: We explore the idea that inhibitory self-control and prohedonic emotion regulation may be incompatible concerns.

Background: Specifically, we propose that because some forms of self-control involve denying oneself hedonic pleasures, it may lead to negative affect. Because people may then prioritize emotion regulation over self-control, negative affect may in turn lead to emotion regulation efforts, specifically the use of emotion regulation strategies, and an increased likelihood of self-control failure.

Method: To explore the relationship between emotion regulation and self-control in daily life, we conducted a secondary analysis of a 6-week, 6-signal-per-day ambulatory assessment data set ($N = 125$ participants with a total of 22,845 completed measurement occasions).

Results: Consistent with our predictions, we found that self-control efforts of resisting a pleasurable desire led to significantly increased subsequent negative affect, which, in turn, led to significantly increased emotion regulation efforts and to significantly more likely self-control failures.

Conclusions: We found evidence for the notion that inhibitory self-control and prohedonic emotion regulation are, on average, somewhat incompatible concerns. We discuss our findings in the context of other phenomena in which emotion regulation concerns may conflict with the pursuit of other goals.

KEYWORDS

affect, desires, emotion, emotion regulation, self-control

1 | INTRODUCTION

Emotion regulation (ER) and self-control have largely been studied separately, although they both involve individuals overriding automatic responses in favor of controlled ones (Paschke et al., 2016). However, the nature of these automatic responses, that is, the target of the

regulation, is different: Whereas ER attempts to alter the experience and expression of one's affective states, such as emotions (Gross, 1998), self-control attempts to overcome an impulse in favor of a competing goal (Milyavskaya et al., 2019). Despite this difference, both abilities have similar benefits, such as increased academic success (Ivcevic & Brackett, 2014; Tangney et al., 2004) and higher levels

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of affective well-being (Côté et al., 2010; Hofer et al., 2011; Hofmann et al., 2014). Here, we build on previous work (Tice & Bratslavsky, 2000), linking ER and self-control to understand their relationship. Specifically, we build on the idea that ER and self-control are concerns that may sometimes be incompatible (Fishbach & Labroo, 2007; Fitouchi et al., 2022).

People have different motives for ER (Tamir, 2016). A common one is to enhance their current hedonic experiences (prohedonic motive; Riediger et al., 2009; Tamir, 2009), which involves the upregulation of positive affect and the downregulation of negative affect. However, individuals may also use ER to fulfill instrumental motives, which can be categorized into performance, epistemic, and social motives (Tamir, 2016): In the case of performance motives, individuals seek to up- or downregulate certain emotional states in order to optimize their performance in a task or activity. For example, one might seek to upregulate anger in order to perform well in an aggressive game (Tamir et al., 2008) or to upregulate fear in order to avoid threats in a game (Tamir & Ford, 2009). Epistemic motives motivate individuals to gather information about themselves that is desirable or confirms their self-image. For example, individuals were motivated to maintain feelings of anger when experiencing injustice, which helped them to evaluate themselves more positively (Green et al., 2019). The third category of instrumental motives is social motives, which promote or maintain social relationships at different levels and influence either the behavior of others or how others see themselves (Tamir, 2016). Finally, Tamir (2016) also discusses eudaimonic motives that motivate individuals to induce certain emotional states in order to feel a sense of meaning in life, such as during various forms of entertainment (Oliver & Raney, 2011). However, because the prohedonic motive of experiencing positive and avoiding negative experiences is potentially most in conflict with individuals' long-term goals, which, in turn, require self-control, we focus on this motive and its ER goals in the present research.

In general, self-control is described as the effortful inhibition of unwanted impulses, which can be thoughts, emotions, or behaviors (Baumeister, 2014). However, this concept has been expanded (Inzlicht et al., 2021) to include, for example, prioritizing one motive over another (Fujita, 2011), noneffortful self-control in the form of, for example, habitual behaviors (Galla & Duckworth, 2015), or proactively resolving a conflict or avoiding a conflict before it even arises (Duckworth et al., 2016; Hofmann & Kotabe, 2012). Common to many definitions is that self-control is used when there is a real or anticipated conflict between competing goals (e.g., Inzlicht et al., 2021, but see Gillebaart, 2018).

In the present study, we focus specifically on self-control as an effortful act to resist an unwanted desire that conflicts with a personal long-term goal, that is, to manage an existing conflict. We want to note that this focus on inhibition does not capture all aspects of self-control, which can also include using one's self-control to initiate or persist in aversive but goal-directed activities (e.g., Hennecke et al., 2019; Hoyle & Davisson, 2016). Our focus on inhibition is consistent with dual-system models of self-regulation (e.g., Hofmann et al., 2009; Metcalfe & Mischel, 1999), in which a "hot" system that responds to the environment and generates impulses to achieve an immediate goal (e.g., experiencing pleasure) competes with a "cold" system that overrides immediate responses to achieve long-term goals. This would include the intervention strategies of the process model of self-control to respond to an existing conflict that generates negative emotions (although preventing a conflict is also an important part of this model; Duckworth et al., 2016), or the strength model of self-control, in which effortful self-control is linked to a limited capacity that, when exhausted, leads to aversive emotions (Baumeister et al., 2007).

Importantly, emotions play a role in all three intrapsychic models: Positive emotions are a source of temptation (the desire to engage in pleasure), aversive emotions are associated with self-control conflicts and potentially demotivate the self-control effort required over time (Inzlicht et al., 2021). Thus, these models assume that individuals deny themselves pleasurable hedonic experiences by resisting impulses in order to achieve their long-term goals that conflict with those impulses. Self-control is needed, for example, when individuals wish to regulate their body weight by trying to avoid eating dessert or when they need to prioritize work over more fun leisure activities. As these examples show, exercising self-control can come at the cost of denying oneself a more pleasurable experience (i.e., an immediate desire) by resisting temptation or engaging in aversive activities in the service of long-term goals (Carver, 2019). In the present study, we focus on the interplay between inhibitory self-control and prohedonic ER. We note, however, that other forms of self-control and ER may go hand in hand in some situations, such as when one uses self-control to avoid lashing out at a coworker during an argument. Here, not only does downregulating one's emotions (instrumental ER) likely require some self-control, but doing so may also be consistent with long-term goals, such as getting along with people at work. It is also worth noting that there is considerable overlap between ER and self-control strategies, as well as important theoretical frameworks that include these strategies (e.g., Duckworth et al., 2016; Gross, 1998). For example, the strategy of distraction can be used for ER (e.g.,

distracting oneself from an emotionally charged situation) and for self-control (e.g., distracting oneself from a temptation that one should not indulge in). However, we focus here on situations in which self-control and ER should clearly not be aligned, that is, prohedonic ER (trying to maximize positive affect and minimize negative affect) and inhibitory self-control (trying to deny oneself immediate gratification in favor of one's long-term goals). Here, it is even possible that deliberately giving in to temptations, such as alcohol, cigarettes, or food (and thus failing to resist a craving), could itself be considered a prohedonic ER strategy, categorized as response modulation (Gross, 2015).

Regarding instances where self-control and prohedonic ER should be at odds with one another, evidence for the notion that enacting one's desires is associated with more positive affect and less negative affect, while resisting them shows the opposite pattern, is relatively scarce. Two studies found that enacting one's tempting desires was significantly associated with more happiness (Friese & Hofmann, 2016; Hofmann et al., 2013), while two recent experience sampling studies found that more effortful self-control in a previous moment predicted less positive affect (Grund & Carstens, 2019; Liu et al., 2023) and also more negative affect in the next moment (Liu et al., 2023). Therefore, we first aimed to replicate previous research by hypothesizing that resisting one's desires, because it involves denying oneself a pleasurable experience, would lead to negative affect and less positive affect (Hypothesis 1a). In addition, we hypothesized that enacting one's desires, because it involves indulging in a pleasurable experience, would lead to positive affect and less negative affect (Hypothesis 1b).

If Hypotheses 1a and 1b are true, this means that engaging in effortful inhibitory self-control would lead to increased negative affect, which, in turn, might trigger the prohedonic ER motive to reduce it. However, this may run the risk of failing at self-control subsequently, as individuals may prioritize the regulation of negative affect at the expense of other goals (e.g., Knapp & Clark, 1991; Tice & Bratslavsky, 2000), making prohedonic ER and self-control somewhat incompatible. There is some evidence for this notion. On the one hand, there is evidence that negative affect predicts more self-control failures, which is also associated with excessive reactivity of the brain's inhibitory regions (Chester et al., 2016). Thus, significant brain resources are used to control negative affect, which are then not available to exercise self-control, making self-control failures more likely. In addition, chronic stress has also been found to be associated with stronger desires in daily life, which can be explained by a greater reward salience due to stress (Wolff et al., 2021), making self-control failures,

again, more likely. In addition, an experience sampling study found that when individuals experienced guilt as a result of failing to resist a desire, they were worse at self-control afterward, but they also rated their self-control goal as more important (Hofmann & Fisher, 2012).

On the other hand, in addition to the large number of studies that have examined how ER strategies predict affect, there are only a few studies that have examined whether affect predicts the use of prohedonic ER in everyday life (Boemo et al., 2022). There is evidence that positive affect predicts less use of rumination (Borders & Lu, 2017; Hoorelbeke et al., 2016; Jones et al., 2017), suppression (Keller et al., 2014), and distraction (Pasyugina et al., 2015). In turn, negative affect was significantly associated with a stronger use of maladaptive ER strategies (Pasyugina et al., 2015; Wilms et al., 2020). Thus, if it is the case that individuals prioritize regulating their negative affect instead of using their resources to control themselves when facing a self-control conflict, negative affect should make individuals more likely to enact their desires as a means of experiencing immediate pleasure, setting them up for self-control failure (Hypothesis 2).

Choosing to regulate one's negative emotions over exerting inhibitory self-control would be consistent with the phenomena of "emotional eating" (e.g., Frayn & Knäuper, 2018) and "retail therapy" according to which people are more likely to eat and to purchase and consume unplanned treats for themselves when they are in a bad mood (Atalay & Meloy, 2011), respectively, and data showing that stress or negative affect can lead to alcohol consumption (e.g., Anthenelli, 2012; Vasse et al., 1998) and gambling behavior (e.g., Blaszczynski & Nower, 2002; Stewart et al., 2008). The combination of Hypotheses 1 and 2 further implies that self-control may cause negative affect and that, ironically, this negative affect may then cause subsequent self-control failure.

Finally, we explore this potential prioritization further, by demonstrating a positive relationship between prohedonic ER efforts, here: the use of ER strategies, and self-control failure (Hypothesis 3). In general, the use of ER strategies reflects people's self-regulatory efforts to shape what emotions one has, when one has them, and how one experiences or expresses these emotions (Gross, 1998). This can be done in a variety of ways, for example, individuals may divert their attention away from their feelings, ruminate, or simply suppress the expression of their feelings (Naragon-Gainey et al., 2017). Previously mentioned indulgent consumption may be another means by which individuals try to regulate their feelings (Livingstone & Srivastava, 2012) and actually goes along with people's use of reappraisal as another ER strategy (Suzuki et al., 2019). Given that, in principle, different ER strategies can work independently of

each other and without involving indulgence and thus self-control failure, observing a positive relationship between their use and self-control failure would be another way of demonstrating that prohedonic ER concerns take precedence over self-control concerns when people experience negative affect. This should be reflected in the use of regulatory strategies and concurrent indulgence (Hypothesis 3). To test these hypotheses and to explore the relationship between ER and self-control in daily life, we conducted a secondary analysis of an ambulatory assessment dataset.

2 | METHODS

2.1 | Transparency and openness

We confirm that we reported all manipulations and exclusions in the present study, but not all measures, as we conducted a secondary analysis of the ambulatory assessment dataset, which was collected for a different research purpose. An overview of all measures, whether used or not, can be found in the study protocol (Rowland et al., 2016). Therefore, the objectives of this study also did not determine the sample size. Because the analyses presented were not planned prior to data collection, and because we already had access to the data, we did not preregister any of the analyses and thus they should be considered exploratory. The data and the analysis scripts are made available on the Open Science Framework (https://osf.io/7cbds/?view_only=6f61f549df6243db98edfb8fc0661b80).

2.2 | Participants

In the parent study, 137 psychology students were randomly assigned to an experimental or control condition based on a power calculation for a small effect of mindfulness training on mindfulness of $d = 0.33$. Participants

were eligible if they were fluent in German, were able to give informed consent, and were aged between 18 and 65 years. Participants received partial course credit and had the opportunity to win one of two \$100 vouchers if they completed at least 80% of the assessments. Following our past decisions, we excluded all participants who completed fewer than one third of the ambulatory assessments, which left a final sample of $N = 125$ participants (77.6% female; $M = 22.9$ years, $SD = 5.1$) with a total of 22,845 completed measurement occasions.

2.3 | Procedure

The parent study consisted of seven weekly laboratory sessions, including a baseline session before training began and an end-of-training session. Between these two sessions, participants attended five additional laboratory sessions, where they could discuss any issues related to the study protocol, and completed a 40-day ambulatory assessment.¹

The day after the first lab session, participants received six signals on their smartphones for 40 consecutive days, prompting them to complete questionnaires about their emotions, ER, and self-control. These signals were randomly distributed between 10 am and 8 pm using the experience sampling application movisensXS (movisens GmbH, Karlsruhe, Germany), with the condition that two consecutive signals had to be 45 to 200 min apart ($M = 103.4$ min, $SD = 34.3$). The adherence was good, with 76% completed assessments.

2.4 | Measures

Descriptive statistics, intraclass correlations, reliabilities, and zero-order correlations for all measures relevant to the research questions of this study are presented in Table 1.

TABLE 1 Means, standard deviations, intraclass correlations, reliabilities, and zero-order correlations of the study variables.

	<i>M</i> (<i>SD</i>)	ICC	Rel _{within}	Rel _{between}	1.	2.	3.	4.	5.
1. Positive affect	52.46 (14.39)	0.43	0.81 ^a	0.92 ^a	–	–0.32	0.002	–0.04	0.09
2. Negative affect	19.09 (13.31)	0.51	0.74 ^a	0.93 ^a	–0.49	–	0.55	0.26	–0.05
3. Emotion regulation tendency	2.27 (0.78)	0.49	–	0.99 ^b	–0.17	0.34	–	0.35	–0.02
4. Resistance strength	1.53 (0.66)	0.16	–	0.87 ^b	–0.12	0.11	0.09	–	–0.40
5. Enactment strength	1.52 (0.64)	0.14	–	0.87 ^b	0.13	–0.05	–0.003	–0.42	–

Note: Zero-order correlations in bold are significant at $p < 0.05$.

^aReliability was estimated using McDonald's ω (McNeish, 2018).

^bReliability was estimated by computing the Spearman-Brown reliability coefficient between person-aggregated scores on odd and even days (Eisinga et al., 2013).

2.4.1 | Affect

Current affect was assessed at the moment of responding to the signal and the items were based on Kuppens et al. (2010), who selected them from the circumplex model of affect (Russell, 1980). In total, participants rated the four positive emotions “excited,” “happy,” “relaxed,” and “satisfied” and the five negative emotions “afraid,” “angry,” “anxious,” “depressed,” and “sad” on a visual analog scale ranging from 0 to 100. We then took the mean, with higher values indicating a stronger positive and negative affect.

2.4.2 | ER

We assessed the endorsement of five ER strategies by asking participants to rate the extent to which they used the following strategies on a scale ranging from 0 (*not at all*) to 6 (*almost all the time*): The item stem was “Since the last beep, have you...,” followed by an item for distraction (“...distracted your attention away from your feelings?”), reappraisal (“...viewed the cause of your feelings from a different perspective?”), rumination (“...brooded about something in the past/future?”), social sharing (“...talked about your feelings with others?”), and suppression (“...suppressed the expression of your feelings?”). The tendency to use ER was assessed by computing the person mean across all ER strategies.

The five ER strategies were selected on the basis of the process model of ER (Gross, 1998, 2015), where distraction and rumination are forms of attentional deployment, reappraisal reflects cognitive change, and suppression is a form of response modulation. Social sharing was selected as a fifth ER strategy to capture intrinsic interpersonal ER.

2.4.3 | Self-control

Self-control was assessed on the grounds of the daily self-control framework (Hofmann et al., 2012). Using a scale ranging from 0 (*no desire at all*) to 7 (*very strong desire*), participants were asked to rate their desire strength (“Are you currently experiencing a desire, or have you experienced a desire within the last 30 min?”). If they did not select 0, participants were also asked to rate conflict strength (“How much has it been conflicting with a personal goal?”), resistance strength (“To which extent have you tried to resist your desire?”), and enactment strength (“To which extent have you acted on your desire?”), utilizing a Likert-type scale ranging from 0 (*not at all*) to 4 (*very much*). The focus of the present research was on resistance strength and enactment strength.

2.5 | Analytic approach

All data sets were prepared and analyzed in Stata 17 (College Station, TX, USA: StataCorp LP). Due to the hierarchical nature of the data, in which measurement occasions were nested within participants, we computed within-person standardized effect sizes (Wang et al., 2019) to model the association at the within-person level and to ease interpretation and comparison and interpret their size based on the following guidelines (Funder & Ozer, 2019): $\beta=0.05$ for very small, $\beta=0.10$ for small, $\beta=0.20$ for medium, $\beta=0.30$ for large, and $\beta=0.40$ for very large associations. To judge the significance of the results, we used an $\alpha=0.05$. To control for any possible impact of the mindfulness training, we regressed each study variable on the mindfulness training and used the respective residual in the analyses. To account for missing values, particularly values missing (completely) at random, we used the maximum likelihood with missing values estimation method, which Stata 17's option for implementing the full information maximum likelihood method (Lang & Little, 2018). In this approach, missing values are not imputed but the parameters are estimated by maximizing the likelihood function, that is, by selecting the values whose distribution seems most plausible for the observed data.

2.5.1 | Hypothesis 1: The effect of resistance and enactment strength on affect

To test our hypotheses, we computed a path model using the sem command in Stata 17 (Figure 1). In the first part of this path model, resistance strength between $t-1$ and t and enactment strength between $t-1$ and t predicted both positive and negative affect at t to examine the predictive relationship between resistance strength and negative affect, testing Hypothesis 1a, and between enactment strength and positive affect, testing Hypothesis 1b. We also included the two-way interaction between resistance and enactment strength between $t-1$ and t to investigate the affective consequences of self-control failure, that is, does negative affect increase the more strongly participants enact the desires they are trying to resist? In addition, we added positive and negative affect at $t-1$ and mean ER endorsement as control variables (not depicted in Figure 1).

2.5.2 | Hypothesis 2: The effect of affect on subsequent ER and self-control failure

In the second part of the model, positive and negative affect at t predicted mean ER endorsement between t and $t+1$ as well as self-control failure between t and $t+1$. The latter variable was captured by creating a binary variable that was set

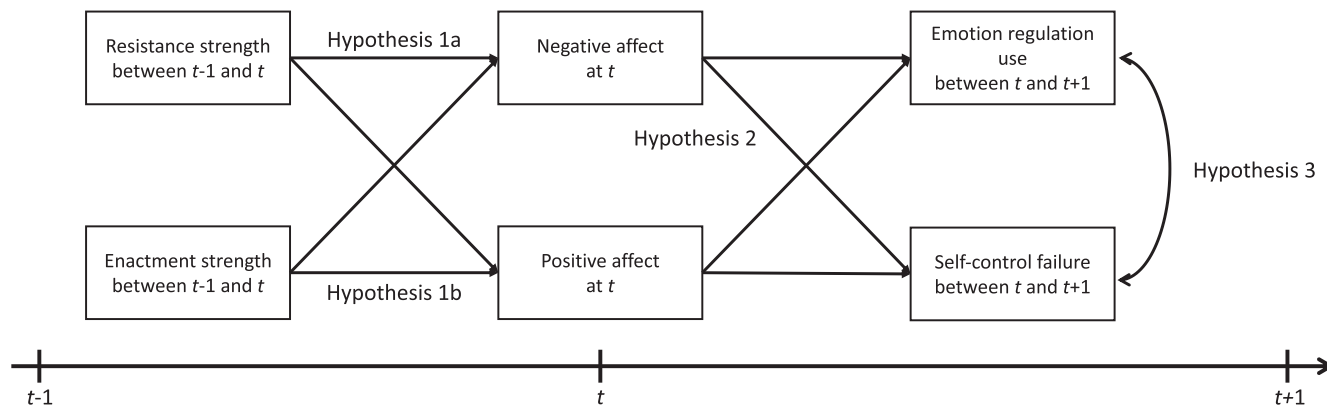


FIGURE 1 Path model testing our hypotheses.

to 0 if participants successfully resisted by not enacting their desire (enactment strength of 0) and to 1 if participants failed to exercise self-control by enacting their desire (enactment strength of >0) despite trying to resist it (resistance strength >0). The path from negative affect to self-control failure tests Hypothesis 2. Again, we controlled for prior mean ER endorsement between $t-1$ and t as well as self-control failure between $t-1$ and t to model change in the outcome.

2.5.3 | Hypothesis 3: ER and self-control as potentially incompatible concerns

Finally, both mean ER endorsement between t and $t+1$ as well as self-control failure between t and $t+1$ were allowed to covary, which tests Hypothesis 3. However, to better capture that ER endorsement may conflict with self-control, we also examined the predictive relationship to better distinguish whether ER efforts lead to an increased likelihood of self-control failure or whether self-control failures lead to more ER efforts. To this end, we computed another path model, in which mean ER endorsement and self-control failure between $t+1$ and t was predicted by prior mean ER endorsement and self-control failure between t and $t-1$.

3 | RESULTS

The results of the path model are illustrated in Figure 2. Although the chi-square test was significant, $\chi^2(16) = 174.4$, $p < 0.001$, other model fit indices showed a very good fit, $RMSEA = 0.02$ and $CFI = 0.99$.

3.1 | Hypothesis 1: The effect of resistance and enactment strength on affect

Figure 2 shows that we found support for Hypotheses 1a and 1b: When participants resisted their desires

more strongly than usual, they reported significantly more negative affect and significantly less positive affect afterward. Conversely, when participants enacted their desires more strongly than usual, they reported experiencing significantly more positive affect, but not more or less negative affect. Thus, we found support for Hypothesis 1a, that resisting one's desires is associated with significantly more negative affect, and for Hypothesis 1b, that enacting one's desires is associated with significantly more positive affect.

We also included the two-way interaction between resistance and enactment strength to examine the affective consequences of self-control failure. For negative affect, this two-way interaction was significant, $\beta = 0.03$, 95% CI [0.01, 0.05], indicating that the impact of resistance on negative affect was significantly stronger when participants enacted their desires, $\beta = 0.10$, 95% CI [0.07, 0.13], than when they did not, $\beta = 0.04$, 95% CI [0.02, 0.07]. This does not only show the affective consequences of failing to exercise self-control, but also that even when resistance was successful, negative affect increased.

3.2 | Hypothesis 2: The effect of affect on subsequent ER and self-control failure

Figure 2 also illustrates the results of the test of Hypothesis 2, where we argued that negative affect should make individuals more likely to enact their desires as a means of experiencing immediate pleasure, thus setting them up for self-control failure. Indeed, this was the case, as participants who experienced more negative affect than usual also reported more self-control failures, that is, they enacted their desires more strongly, even though they tried to resist them, $\beta = 0.04$ (see Figure 2). Thus, we found evidence that resisting one's desires is associated with an increase in subsequent negative affect (Hypothesis 1a),

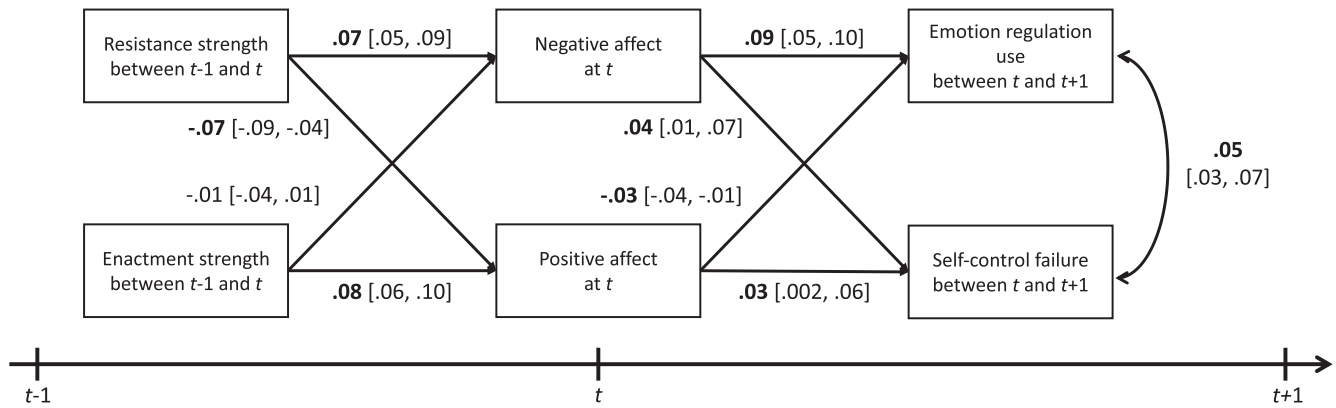


FIGURE 2 Path model depicting the predictive relations between momentary resistance strength and momentary enactment strength on momentary affect as well as the predictive relations between momentary affect on momentary ER strategy use and the enactment of desires that participants attempted to resist (i.e., self-control failure). ER, emotion regulation.

which, in turn, is associated with subsequent self-control failure (Hypothesis 2).

In addition, we ran a model, in which self-control failure between $t+1$ and t was predicted by resistance strength between t and $t-1$, controlling for prior self-control failure between t and $t-1$. This model yielded a positive but nonsignificant coefficient for resistance strength, $\beta=0.03$, 95% CI [-0.01, 0.06], indicating that resisting one's desires more strongly was not significantly associated with a greater likelihood of failing to successfully exercise resistance.

3.3 | Hypothesis 3: Prohedonic ER and self-control as potentially incompatible concerns

In Hypothesis 3, we argued that this positive effect of prior negative affect on subsequent self-control failure could be explained by the incompatibility of inhibitory self-control and ER. And indeed, Figure 2 shows that negative affect not only led to a greater likelihood of subsequent self-control failure but also to more ER efforts, possibly to reduce the negative affect. Importantly, mean ER use was significantly associated with a greater likelihood of self-control failure, $\beta=0.05$ (see Figure 2). That is, participants who regulated their emotions more strongly than usual also reported enacting their desires despite trying to resist them. This association was also significant at the between-person level and could be interpreted as a large, $\beta=0.35$, 95% CI [0.19, 0.50]. This means that participants who regulate their emotions more than others failed at self-control more often.

However, we hypothesized that when people are currently experiencing negative affect, they may prioritize its regulation at the expense of other goals. Importantly, this cannot be tested using concurrent relations, as it could also

be the other way around. Thus, we examined the predictive relations by computing another path model, in which prior mean ER endorsement and prior self-control failure predicted subsequent mean ER endorsement and subsequent self-control failure ($\chi^2(1)=24.8$, $RMSEA=0.03$, $CFI=0.99$). This model revealed that prior mean ER endorsement was significantly associated with increased subsequent self-control failure, $\beta=0.04$, 95% CI [0.01, 0.06], but not vice versa, $\beta=0.01$, 95% CI [-0.01, 0.04].

3.4 | Supplemental analyses

To capture ER tendency, we used mean ER endorsement to test our hypotheses. One problem with this operationalization, however, is that people may use only a single ER strategy very heavily and thus be highly engaged in ER, but this may result in a relatively low mean ER endorsement score. To address this issue, we computed the same path model as in the main analyses, but with the individual ER strategy instead of mean ER endorsement.² The results in Table 2 show that not only did negative affect lead to increased subsequent use of ER strategies, but that ER strategy use was also consistently associated with a greater likelihood of self-control failure, except for social sharing, which also showed a positive association but did not reach significance. Taken together, these results largely replicated the results of the main analyses.

4 | DISCUSSION

In this study, we examined the relationship between prohedonic ER and inhibitory self-control, suggesting a potential conflict between these concepts. If self-control requires sacrificing immediate gratification, we hypothesized that

TABLE 2 Results of the supplemental path models.

ERS	Positive affect at $t \rightarrow$ ERS use between $t+1$ and t		Negative affect at $t \rightarrow$ ERS use between $t+1$ and t		ERS use at $t \sim$ SC failure between $t+1$ and t	
	β	95% CI	β	95% CI	β	95% CI
Distraction	-0.03	[-0.04, -0.01]	0.08	[0.07, 0.10]	0.06	[0.04, 0.08]
Reappraisal	0.01	[-0.01, 0.03]	0.07	[0.05, 0.09]	0.05	[0.03, 0.07]
Rumination	-0.02	[-0.03, -0.002]	0.06	[0.04, 0.07]	0.03	[0.01, 0.05]
Social sharing	0.01	[-0.01, 0.02]	0.05	[0.04, 0.07]	0.02	[-0.004, 0.04]
Suppression	-0.04	[-0.06, -0.03]	0.06	[0.05, 0.08]	0.05	[0.03, 0.07]

Note: Estimates in bold are significant at $p < 0.05$.

Abbreviations: ERS, emotion regulation strategy; SC, self-control.

it would result in increased negative affect (Hypothesis 1a), whereas acting on desires would lead to increased positive affect (Hypothesis 1b). Encouragingly, our results supported both hypotheses. Importantly, we found direct evidence for the notion of conflict between prohedonic ER and self-control (inhibition): We found that when individuals experienced negative affect, they were not only more likely to act on the desires they were trying to resist (and thus fail at self-control; Hypothesis 2), but they were also more likely to use strategies to regulate their negative affect. Importantly, these two were significantly related, that is, the greater the use of ER strategies, the greater the self-control failure, suggesting a partial incompatibility between prohedonic ER and self-control (Hypothesis 3). To provide further evidence for Hypothesis 3, we examined predictive relationships and found that prior average ER was significantly associated with increased subsequent self-control failure, but not vice versa. We conclude that self-control efforts of resisting a pleasurable desire appears to lead to negative affect, whereas giving in to these desires appears to lead to positive affect. Subsequently, when people experience negative affect, they appear to prioritize prohedonic ER at the expense of subsequent self-control. Ironically, then, the negative affect that sets people up for self-control failure may arise because of an earlier self-control attempt of denying oneself a pleasurable experience, suggesting a causal chain in which self-control attempts to inhibit something pleasurable cause negative affect, which, in turn, undermines future self-control attempts by prioritizing immediate hedonic goals over long-term goals.

4.1 | Theoretical implications

These findings have important theoretical implications. They show that although prohedonic ER and self-control (inhibition) are theoretically distinct aspects of self-regulation (Tice & Bratslavsky, 2000), they may to some extent be incompatible concerns. This incompatibility

between regulation in the service of long-term goals and regulation in the service of immediate hedonic goals also occurs in other domains: For example, people sometimes choose not to view important but potentially distressing information in order to avoid negative feelings, even though viewing this information could be important and potentially save their lives (Howell & Shepperd, 2013; Sweeny et al., 2010). Moreover, ER in response to threats (e.g., threats to biodiversity) or politically opposing views (e.g., those that might evoke anger) may have the unintended consequence of inhibiting political action, such as fighting the threat or one's political opponents (Ford et al., 2019; Wenzel, Rowland, et al., 2023) because negative emotions are no longer mobilizing. According to control theory, positive affect is seen as a signal of faster-than-expected goal progress, which, in turn, tells us that we can reduce the effort we are currently investing in a focal goal (Carver & Scheier, 1990). Although the positive affect of pursuing the current goal might feel good, it ironically tells us to, for the time being, prioritize other goal pursuits. In general, regulating the balance between maximizing hedonic experiences and making progress toward nonhedonic goals seems to be an important "meta-regulatory" goal in people's lives.

Our findings are also consistent with models of self-control. For example, the process model of depletion (Inzlicht & Schmeichel, 2012), a model that itself addresses the notion that people seek to balance hedonic and nonhedonic goals, was originally proposed as an alternative to the strength model of self-control (e.g., Baumeister & Vohs, 2007), given that the strength model has been criticized due to failed replications (Lurquin et al., 2016), small effect sizes (Hagger et al., 2016), publication bias (Carter & McCullough, 2014), artificial laboratory settings and many other limitation (Friese et al., 2019). The process model depletion (Inzlicht & Schmeichel, 2012) explains the potential causal effect of self-control performance at Time 1 on subsequent self-control failure at Time 2 without a limited capacity of self-control. According to this model, the exercise of self-control at Time 1 causes temporary shifts in

both motivation and attention that undermine self-control at Time 2. Put more simply, individuals who have exercised self-control at one time are less likely to exercise additional self-control later as they attempt to balance conflicting goals. These conflicting goals are long-term goals that require self-control but also immediate prohedonic goals. Whereas long-term goals explain why people invest effort in work or other aversive but important activities, immediate prohedonic goals explain why people engage in pleasurable activities. Our findings may reflect that individuals attempt to achieve some sort of balance between the long-term goals for which they require self-control and their prohedonic ER goals of experiencing high positive and low negative affect. Once an individual has exercised self-control, he or she becomes more likely to subsequently prioritize prohedonic ER, particularly because exercising self-control has resulted in more negative affect. Moreover, this idea is consistent with value-based choice models of self-control (Berkman et al., 2017). Such models suggest that engaging (or not engaging) in self-control is a choice based on potential gains and costs. Thus, motivational shifts could be understood as a change in how people perceive the gains associated with self-control relative to the gains associated with engaging in ER (i.e., negative affect would increase the perceived gains of engaging in prohedonic ER relative to engaging in more self-control). Such a decision might also take into account the opportunity costs associated with the mental effort required to engage in self-control (Kurzban et al., 2013), which might be reduced in subsequent situations after previous self-control exertion in order to free up these limited cognitive resources for other cognitive tasks, such as ER. Our findings fit well with the idea that, after previous self-control, people might choose not to engage in self-control in favor of engaging in ER. Furthermore, they fit well with the idea that both self-control and ER “fight” for the same limited cognitive resources.

Our work is also consistent with the general notion that individuals balance between different goals (Fishbach & Dhar, 2005) or engage in self-licensing (e.g., De Witt Huberts et al., 2014; Mukhopadhyay & Johar, 2009). This research suggests, not unlike value-based choice models, that people sometimes appear to fail at self-control when they are actually choosing not to exercise it. For example, after a long, hard day at work, a person may decide that they deserve a pleasurable experience (e.g., eating nachos and sipping a margarita on the couch), even though they are fully aware that this pleasurable experience is in conflict with a long-term goal (e.g., being healthy and slim). This self-licensing is also reflected in the justifications people use for their indulgence, some of which may explicitly refer to ER at the expense of self-control, such as “I need to cheer up” or “Eating this will perk me up” (Taylor et al., 2014).

4.2 | Resolving the conflict between ER and self-control concerns

The view we have argued here, and which is probably a widely held view, is that prohedonic ER and self-control concerns can be in conflict when people are denying themselves something pleasurable, and that balancing them requires shifting priorities. However, there has also been a recent surge of work showing that this is not necessarily the case and that the two concerns can be combined. For example, it has recently been argued that pleasure-seeking may not necessarily be a problem for self-control if individuals find ways to increase their positive affective experiences while pursuing long-term goals (Becker & Bernecker, 2023). This idea is supported by findings showing that individuals with higher levels of self-control actually resist temptations less often in their daily lives (Hofmann et al., 2012) and find more enjoyment and autonomous motivation in their daily tasks (Converse et al., 2019) than individuals with lower levels of self-control. Perhaps, the scale used in this work, the Self-Control Scale (Tangney et al., 2004), does not really assess self-control in terms of stable individual differences in the ability to exert effortful willpower but rather captures individual differences in the ability to combine hedonic experience and long-term goal pursuit. This would also explain why people who score high on the capacity for self-control also report higher overall affective well-being (Hofmann et al., 2014; Wenzel et al., 2021).

How can people combine ER and self-control? One line of research suggests that avoiding self-control conflicts through situation selection (e.g., choosing a form of exercise that is already enjoyable) or making self-control easier and tempting alternatives less tempting through situation modification (e.g., turning on favorite music while exercising) may be highly effective routes to long-term goal attainment (Duckworth et al., 2016; Milkman et al., 2014; Wenzel, Bürgler, et al., 2023; Woolley & Fishbach, 2017). Thus, self-control should be possible without the experience of foregoing a pleasurable experience or the necessity of engaging in an aversive activity. Moreover, people may strategically allow themselves certain indulgences to protect themselves from more severe disinhibition when urges become too strong and potentially more difficult to control (Jia et al., 2019; Prinsen et al., 2019).

4.3 | Limitations

Due to the complexity of ER and self-control in everyday life, our study has some limitations. One such limitation is that we did not distinguish between different experiential

states. However, this might be important because one explanation for the prospective relationships found in the present research may be that negative affect may also reflect mental fatigue due to previous self-control attempts, which has been found to be associated with failures in self-control (Clarkson et al., 2010). However, contrary to our findings suggesting that self-control attempts to lead to more negative affect, an experience sampling study by Wilkowski et al. (2018) found that the conflict between desires and goals actually predicted mental fatigue, rather than reduced self-control attempts themselves. Mental fatigue, in turn, was associated with more self-control failures. Wilkowski et al. (2018) explained this finding in terms of a reduced cognitive capacity that is divided between different goals (Kurzban et al., 2013). This limited cognitive capacity in the form of working memory capacity may make it difficult to stay on track with the long-term goal (which would require self-control) when the desire to feel better (which would require ER) competes with it. Furthermore, Wilkowski et al. (2018) also found that earlier self-control events led to later desire enactment, but this was not due to a reduction in the effectiveness of self-control use, as would be suggested by the strength model of self-control. Rather, individuals engaged in the desire enactment without attempting to resist the desire after having engaged in self-control in the preceding moment. This also supports our finding that after engaging in self-control, individuals want to feel better, which may motivate them to engage in ER. Thus, future research should examine both mental fatigue and negative affect, and better differentiate them to examine the extent to which each contributed to lapses in self-control in everyday life.

In addition to distinguishing between mental fatigue and negative affect, it may be important to distinguish between different positive and negative affective states. In previous EMA studies, successful resistance was associated with more feelings of pride (Frieze & Hofmann, 2016; Hofmann & Fisher, 2012). Furthermore, engaging in desires may not necessarily improve one's affective experiences. Instead, it could also evoke feelings of guilt (Hofmann & Fisher, 2012). However, when exploring recurring similar desires in daily life, guilt was found to worsen self-control but was also found to increase the importance of the conflict and may have increased the commitment to one's long-term goals (Hofmann & Fisher, 2012). Unfortunately, we did not assess guilt and pride, and we did not examine recurring desires so we might have missed detecting a possible positive effect of negative affect on self-control. Thus, future research should differentiate between different types of positive and negative affective states to better understand which state may promote lapses in self-control or the use of ER strategies.

Here, we also want to discuss our focus on inhibitory self-control (i.e., resisting desires) as opposed to other forms of self-control, such as initiating or persisting in aversive activities that are consistent with one's long-term goals (e.g., Hennecke et al., 2019; Hoyle & Davison, 2016). The previously cited literature on feelings of guilt and pride (Frieze & Hofmann, 2016; Hofmann & Fisher, 2012) also focused on this form of inhibitory self-control. It is possible that affective responses to self-control successes of inhibition are, on average, different from those of initiation and/or persistence. One reason for this may be related to the different activities that people might want to initiate and/or persist in. For example, physical exercise, which is a commonly studied area of self-control (Boat & Cooper, 2019), itself has a decades-long research history on affective responses during and after exercise (Ekkekakis & Brand, 2019), showing complex effects moderated by different aspects of the exercise itself (e.g., intensity) and individual differences (e.g., tolerance for exercise intensity; Ekkekakis et al., 2020). However, despite these complexities, acute bouts of exercise have been shown to improve subsequent self-control (Boat & Cooper, 2019), supporting our hypothesis that it may be important to distinguish between different types of self-control (i.e., inhibition, initiation, and persistence) and the different activities associated with them.

Another critical point in our present study is the ER strategies we chose to explore, which were chosen because they reflect the different stages of the process model of ER (Gross, 2015). However, we did not assess situation selection or modification as the first stage of the model. Situation selection is used to avoid situations in which emotionally relevant and stressful events are avoided, which may reduce the likelihood of experiencing negative affect in the first place and therefore reduce the risk of failing to exercise self-control.

Furthermore, we only focused on prohedonic ER. Given that individuals regulate their emotions not only to feel better but also to maintain social contacts or to feel that they are engaged in a meaningful life (Tamir, 2016), many other ER strategies, which may even be aimed at maintaining negative affect or reducing positive affect, could also be explored in relation to self-control efforts in future research. Depending on different ER motives, negative affect may not necessarily be interpreted as being "aversive" and may not necessarily increase ER or have the same association with self-control failures as found in the present research.

Moreover, we recruited a predominantly female sample of Western European students. It is possible that our findings may not be replicated in other cultures. For example, it has been found that Americans are more likely to believe that their willpower was depleted after engaging

in self-control, whereas Indians were more likely to feel energized by engaging in self-control (Savani & Job, 2017). Thus, due to cultural differences, other individuals may even experience positive affect after resisting a desire, which may even enhance their self-control performance in the future.

In addition to possible cultural differences that may influence whether self-control efforts are viewed as energizing or draining, the use of self-control itself may also be less effortful if individuals are accustomed to it, for example, by using habitual self-control (e.g., Galla & Duckworth, 2015), or if, similar to ER, they use proactive self-control to avoid temptations that would otherwise have led to an even greater self-control conflict (e.g., Duckworth et al., 2016). Therefore, future research could also examine whether negative affect also predicts more ER rather than self-control use when assessing self-control as habit or pro-active self-control strategies.

Furthermore, we did not consider possible situational circumstances that may influence whether engaging in self-control results in negative affect, which, in turn, may increase self-control failures due to prioritizing ER. Many different moderators may be possible. For example, state mindfulness was found to be associated with more happiness and less guilt when a desire was enacted but was not associated with regret when a desire was not enacted (Friese & Hofmann, 2016). Another study found that the use of effortful self-control was associated with less positive affect when the activity was less self-determined, that is, when there was a sense of purpose in trying to resist or exert self-control (Liu et al., 2023).

Finally, in the present research, we note that our findings suggest that the use of self-control conflicts with ER when individuals experience negative affect. However, we did not directly examine this conflict—we only assessed whether individuals experienced a conflict between desires and a personal goal. However, to assess our claim, future research could also assess the degree of conflict experienced more directly between the use of ER (or the desire to regulate one's emotions) and the use of self-control.

5 | CONCLUSION

When it comes to self-control of resisting desires and prohedonic ER, it seems that we may not have our cake and eat it too. Such self-control efforts deny us pleasurable experiences with negative consequences for our current affect and current negative affect lets us prioritize ER at the expense of self-control. Given that self-control and ER can be incompatible concerns, at least in a given moment, people may need to find other ways to balance the two,

possibly over longer periods of time, prioritizing one and sometimes the other. Where the sweet spot of that balance lies is another question.

AUTHOR CONTRIBUTIONS

Mario Wenzel: Conceptualization, Methodology, Formal analysis, Data Curation, Writing - Original Draft. Zarah Rowland: Writing - Review & Editing. Sebastian Bürgler: Writing - Review & Editing. Marie Hennecke: Conceptualization, Writing - Original Draft.

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CONFLICT OF INTEREST STATEMENT

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

ETHICS STATEMENT

The study protocol was approved by the Ethics Committee of the Department of Psychology at the Johannes Gutenberg University Mainz (reference code 2015-JGU-psychEK-011), met all ethical standards of the Declaration of Helsinki (2013), and all participants provided informed consent.

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ENDNOTES

¹ Participants in the experimental and control conditions received the same study material in all laboratory sessions but participants in the experimental condition also practiced mindfulness in the laboratory by completing a 12-min computer-based breathing meditation (Levinson et al., 2014) and in daily life by either listening to a breathing meditation (11 min) or by completing a body scan (23 min; please refer to the parent study by Rowland et al. (2016) for more information regarding the home practice).

² We only computed the second part of the path model depicted in Figure 1 because only the second part included ER strategies. All five path models showed a very good fit to the data, $RMSEAs \leq 0.02$ and $CFIs \geq 0.99$. The complete fit indices can be found in the full results on the OSF project page (https://osf.io/7cbds/?view_only=6f61f549df6243db98edfb8fc0661b80).

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