


# Too much of a good thing? Exploring the inverted-U relationship between self-control and happiness

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## Abstract

**Objective:** Can having too much self-control make people unhappy? Researchers have increasingly questioned the unilateral goodness of self-control and proposed that it is beneficial only up to a certain point, after which it becomes detrimental. The little empirical research on the issue shows mixed results. Hence, we tested whether a curvilinear relationship between self-control and subjective well-being exists.

**Method:** We used multiple metrics (questionnaires, behavioral ratings), sources (self-report, other-report), and methods (cross-sectional measurement, dayreconstruction method, experience sampling method) across six studies ( $N_{\text{total}} = 5,318$ ).

**Results:** We found that self-control positively predicted subjective well-being (cognitive and affective), but there was little evidence for an inverted U-shaped curve. The results held after statistically controlling for demographics and other psychological confounds.

**Conclusion:** Our main finding is that self-control enhances subjective well-being with little to no apparent downside of too much self-control.

## KEYWORDS

curvilinear, happiness, self-control, self-regulation, well-being

## 1 | INTRODUCTION

Can too much self-control make you unhappy? The literature suggests different answers. One perspective argues that there is no downside to self-control since people with more tend to be happier and view their lives as being highly satisfying (Hofmann, Luhmann, Fisher, Vohs, & Baumeister, 2014). Another perspective holds that some self-control is beneficial, but there could be costs to having too much—namely, in the form of reduced subjective well-being (SWB) or affective and cognitive evaluations of one's life (Diener, Suh, Lucas, & Smith, 1999). Self-control, defined as the ability to control short-term impulses and desires in conflict with long-term goals (Hofmann, Baumeister, Förster, & Vohs, 2012), could entail frequent and sometimes unnecessary regulation

of emotions, thoughts, and behaviors, resulting in a life marked by rigidity and blandness, thereby lowering SWB (Grant & Schwartz, 2011).

Among different virtues, self-control has been recognized as a “master virtue” that makes all other virtues possible (Baumeister & Exline, 1999). At the same time, the development of self-control is a central concern of schools (Diamond & Lee, 2011), and, consequently, interventions have been designed to improve self-control under the assumption that there is no downside. However, these interventions may be harmful if self-control is ranged to problematic levels. Despite the importance of self-control (Duckworth & Kern, 2011), SWB (Diener et al., 1999), and competing viewpoints on their relationship, there is scant research on the topic. Hence, we tested whether happiness declines at high levels of self-control.

## 1.1 | Two theoretical perspectives on self-control and SWB

Psychologists widely agree that self-control promotes SWB. There are many mechanisms through which self-control fosters SWB. Someone with high self-control may feel a flush of success by routinely setting goals, making progress toward them, and ultimately accomplishing their objectives. Similarly, when faced with a choice between the immediate and delayed reward, individuals can experience positive emotions by simply anticipating what it will feel like when they eventually reach a distal goal (MacLeod, Coates, & Hetherington, 2008). Further, self-control aids in making progress toward goals, which leads to positive emotions (Bagozzi, Baumgartner, & Pieters, 1998). Those with higher levels of self-control also employ better strategies that facilitate goal progress and accomplishment (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011), which leads to longer-term happiness (Diener et al., 1999).

Although most researchers agree that self-control is generally positive, they do not agree on whether someone can have too much self-control. One perspective, which argues that self-control has a functional relationship with SWB, states that SWB monotonically increases as self-control increases. This reasoning makes sense through an evolutionary lens—people exercise self-control in order to increase their chances of survival, which is inextricably tied to well-being. It is hypothesized that the prefrontal cortex (the part of the brain most responsible for self-control) developed when humans needed to restrain impulsive instincts to improve survival (and well-being) of their present and future self (Barkley, 2001; Dunbar, 2003). Behaviors that improved the chances of survival were rewarded with positive feelings, whereas negative feelings were the result of behaviors that decreased the likelihood of survival (Grinde, 2005). It is not surprising that self-regulation benefits a wide variety of life outcomes, such as health (Tsukayama, Toomey, Faith, & Duckworth, 2010), relationships (Tangney, Baumeister, & Boone, 2004), and work/scholastic outcomes (Duckworth & Seligman, 2005), all of which in turn can promote SWB. If exercising self-control only occurs when it is beneficial for well-being, it is unlikely that we would observe downturns in well-being at high levels of self-control.

Conversely, positive antecedents can eventually turn negative if taken too far. This is known as the “too much of a good thing” effect (Pierce & Aguinis, 2013), which questions the unilateral goodness of self-control. Ideas of a “dark side” of self-control run deep in psychology, beginning as early as Freud’s ideas of anal retentiveness, which refers to individuals with a strong compulsion for control. More recent research suggests something similar—overregulating cognitions, emotions, and behaviors can harm positive interpersonal relationships (Letzring, Block, & Funder, 2005),

which will likely have detrimental consequences for well-being given the importance of social relations for SWB (Tay & Diener, 2011). Individuals with excessive self-control may have obsessive-compulsive tendencies for rigidity and inhibition, which may hinder social relationships (Letzring et al., 2005). In line with this, researchers have found the expected curvilinear pattern in closely related constructs. For example, abnormally high levels of conscientiousness predict obsessive-compulsive behaviors and less psychological well-being (Carter, Guan, Maples, Williamson, & Miller, 2016). Similarly, anorexia, which can be regarded as overregulation of eating (Halse, Honey, & Boughtwood, 2007), is associated with lower SWB (Kitsantas, Gillgan, & Kamata, 2003).

Another line of research argues that goal setting may not always be beneficial (Ordóñez, Schweitzer, Galinsky, & Bazerman, 2009). Goal setting is a primary mechanism through which self-control produces positive life outcomes such as SWB (Cheung, Gillebaart, Kroese, & De Ridder, 2014; Hofmann et al., 2014). There are personal and psychological trade-offs when setting and investing in goals. Individuals with high self-control may focus exclusively on the accomplishment of their personal goals, potentially to the detriment of their personal happiness (McGregor & Little, 1998). Furthermore, ignoring this trade-off may lead to excessive worrying and anxiety (Pomerantz, Saxon, & Oishi, 2000). By consistently refraining from immediate gratification and instead focusing on one’s goals, one never fully reaps the fruits of one’s labor, thereby negatively impacting SWB.

## 1.2 | Past studies

Scant research has investigated the curvilinear relationship between self-control and well-being. To our knowledge, the three studies that directly test for a curvilinear relationship have had limited success in finding supporting evidence. In a study of young adults, Tangney et al. (2004) found that people with more self-control were less depressed, anxious, and paranoid, and they had less obsessive-compulsive tendencies. Further, Finkenauer, Engels, and Baumeister (2005) found that adolescents with more self-control were less depressed and less stressed. Neither of these studies found significant curvilinear effects. In contrast, Situ, Li, and Dou (2016) examined the relationship between self-control and emotional well-being (e.g., depression, anxiety) and found significant quadratic effects across three different samples (adolescents, young adults, employees). However, people with high self-control did not experience more emotional problems. Instead, the results reflected a pattern of diminishing returns where self-control improved emotional well-being up to a point, beyond which it had no effect.

It is important to note that none of these studies measured SWB directly. In each of the studies, well-being was conceptualized as maladaptive attitudes or behaviors (e.g., depression, obsessive compulsion). Research has shown that these are related to SWB but are conceptually distinct (e.g., Brown, Chorpita, & Barlow, 1998; Watson, Clark, & Carey, 1988). Furthermore, these studies only evaluated affective/emotional components of well-being, and it is important to further evaluate the curvilinear relationship between self-control and cognitive aspects of SWB (i.e., life satisfaction). Methodologically, past research has been conducted using cross-sectional assessments with self-reported data. Although SWB is often assessed through self-report questionnaires, it is beneficial to use multiple measures (e.g., informant reports, behavioral measures) and research designs (e.g., day reconstruction, experience sampling) to examine this issue.

### 1.3 | Current investigation

The current investigation uses new and existing data to test our hypotheses. Previous publications have used data from Study 1 (e.g., Park, Tsukayama, Goodwin, Patrick, & Duckworth, 2017), Study 2 (e.g., Tsukayama, Duckworth, & Kim, 2013), Study 3 (e.g., Galla et al., 2014), and Study 6 (e.g., Hofmann et al., 2012; Hofmann, et al., 2014). The current research questions and analyses do not overlap with previous reports from these data sets.

Through six studies, the present article directly examines how self-control relates to different components of SWB while also expanding on past methodological approaches. Although we varied the methodological techniques across studies, we consistently measured SWB using Diener and colleagues' (1999) tripartite conceptualization (positive affect, negative affect, and life satisfaction). Also, although self-control manifests differently across contexts and age ranges, our measures were centered on the idea that self-control represents the tendency to control short-term impulses that conflict with long-term goals (Hofmann et al., 2012).

We also took precautions to control for potentially confounding variables—such as demographics, Extraversion, Openness, Agreeableness, and Neuroticism—when they were available. Because self-control is a facet of Conscientiousness (Eisenberg, Duckworth, Spinrad, & Valiente, 2014), it was not included as a control due to shared variance.

We adopted a similar analytic strategy across studies by conducting hierarchical linear regression analyses with a base model (control variables), a self-control model (base model with self-control measure), and a quadratic model (self-control model with the addition of a quadratic term). Additionally, we took extra analytic steps in examining the inverted-U effect. Because individuals use an ideal-point response process (i.e., it assumes a nonmonotonic relation between the trait and observed score) for self-reports of

constructs such as self-control and SWB (Tay & Drasgow, 2012; Tay, Drasgow, Rounds, & Williams, 2009; Tay & Kuykendall, 2016) and recent research suggesting that ideal point response models may more accurately detect curvilinear relationships (Carter et al., 2014), we also examine whether ideal-point scoring (compared to typical factor scoring) yields different results. Furthermore, due to the multiple comparisons conducted, we applied Bonferroni corrections in each study to reduce the likelihood that significant results are due to chance (Abdi, 2007). That is, we divided traditional significance values (i.e., .05, .01) by the total number of analyses conducted in each study.

The first three studies were conducted on similar samples (5th–12th graders) using similar measures (self-reports of SWB, self- and teacher reports of students' self-control). Given the similarity of the measures, we also conducted an integrative data analysis (Curran & Hussong, 2009), and these studies are discussed both individually and collectively. In order to address the issue of reference bias (i.e., the use of different standards when endorsing items based on context; Duckworth & Yeager, 2015) associated with questionnaires, we added a behavioral self-control task (D'Mello, Galla, & Duckworth, 2017) known to be immune to these effects (O'Brien et al., 2017) in Study 4.

Study 5 tested the predictions using college undergraduates. Because there can be systematic biases associated with self-report measures of SWB, this study used the Day Reconstruction Method (DRM; Kahneman, Krueger, Schkade, Schwartz, & Stone, 2004), which evokes specific contexts to gather reports of episodic affect. Last, Study 6 used an experience sampling method (ESM) on a sample of community adults. Our use of diverse measures and samples allowed for more robust tests of the competing hypotheses.

## 2 | STUDY 1

Study 1 used middle-school students to test for a curvilinear effect between self-control and SWB. Students completed a measure of self-control that taps their ability to control their impulses in academic and interpersonal contexts. Additionally, teachers rated students' self-control in these two contexts. Students also reported their SWB through reports of positive and negative affect as well as a rating of their current life satisfaction.

### 2.1 | Method

#### 2.1.1 | Participants

Participants were 1,539 fifth- through eighth-grade students ( $M_{\text{age}} = 11.65$ ,  $SD = 1.30$ ; 52.4% female) from seven schools in the United States. The sample included African

American (32%), Caucasian (17%), Hispanic (43%), Asian (5%), Native American (1%), and multi-racial (2%) individuals.

## 2.1.2 | Measures

### Self-control

Students completed the Domain Specific Impulsivity Scale for Children (Tsukayama et al., 2013). The measure required students to rate their self-control behaviors at school ( $\alpha = .73$ ) with four items (e.g., “I paid attention and resisted distractions”) and during interpersonal interactions ( $\alpha = .78$ ) with four items (e.g., “I remained calm even when criticized or otherwise provoked) on 7-point Likert scales (1 = *Almost Never*, 7 = *Almost Always*).

Teachers ( $N = 134$ ) were presented with the same self-control items as the students; however, they were asked to provide an overall evaluation of each student’s school and interpersonal self-control on 7-point Likert scales (1 = *Almost Never*, 7 = *Almost Always*). On average, teachers rated 3.5 students, and inter-rater reliability was moderate for both school ( $r_{wg} = .49$ ) and interpersonal ( $r_{wg} = .40$ ) self-control. Student and teacher ratings were also moderately correlated ( $r = .44$ ,  $p < .01$  for school;  $r = .46$ ,  $p < .01$  for interpersonal).

### Subjective well-being

Students reported how often they feel six positive feelings (e.g., happy, relaxed, excited) and four negative feelings (e.g., sad, worried, angry) to assess positive ( $\alpha = .83$ ) and negative ( $\alpha = .68$ ) affect (1 = *Never*, 5 = *Always*). As an indicator of life satisfaction, students answered the question

“Overall, how satisfied are you with your life?” (1 = *Extremely Unsatisfied*, 7 = *Extremely Satisfied*).

### Statistical controls

We controlled for gender, the school the student attended, and ethnicity. We also controlled for student-reported Extraversion ( $\alpha = .66$ ), Agreeableness ( $\alpha = .80$ ), Openness ( $\alpha = .74$ ), and Neuroticism ( $\alpha = .82$ ) using four selected items from the Big Five Inventory (BFI-44; John & Srivastava, 1999) for each construct, which was measured concurrently with the self-control and SWB ratings.

## 2.2 | Results

Table 1 reports results from the regression analyses. We applied Bonferroni corrections to the 12 regression analyses. Significance values were divided by 12, resulting in significance thresholds of .004 (for  $\alpha$  at .05) and .0008 (for  $\alpha$  at .01). Both self-reported and teacher-reported ratings of self-control significantly predicted all three components of SWB, with the exception that teacher ratings of school self-control did not predict negative affect ( $r = -.05$ ,  $p > .004$ ). There was no evidence for curvilinear effects.

We then applied an ideal-point model scoring approach (as recommended by Carter et al., 2014) to all multi-item measures (student-reported self-control, positive and negative affect) through the GGUM2004 software (Roberts, Fang, Cui, & Wang, 2006). This approach cannot be applied to single-item measures (teacher ratings of student self-control, and self-reports of life satisfaction). Ten of the aforementioned analyses were rerun using the ideal point model scores in lieu of mean estimates. The two exceptions were the

**TABLE 1** Study 1 standardized regression coefficients of self-control variables on SWB

	Positive Affect				Negative Affect				Life Satisfaction			
	Self-Report		Teacher Report		Self-Report		Teacher Report		Self-Report		Teacher Report	
	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$
SCS	.30**	.31**	.13**	.11**	-.18**	-.18**	-.05	-.05	.27**	.24**	.11**	.11**
SCS <sup>2</sup>		.01		-.05		-.01		.00		-.06		.00
R <sup>2</sup>	.26**	.26**	.20**	.20**	.23**	.23**	.21**	.21**	.21**	.21**	.17**	.17**
$\Delta R^2$	.07**	.00	.01**	.00	.03**	.00	.00	.00	.06**	.00	.01**	.00
SCI	.30**	.32**	.11**	.11**	-.23**	-.23**	-.10*	-.10*	.22**	.20**	.10**	.11**
SCI <sup>2</sup>		.04		.00		.00		-.01		-.05		.02
R <sup>2</sup>	.25**	.25**	.20**	.20**	.25**	.25**	.22**	.22**	.19**	.19**	.17**	.17**
$\Delta R^2$	.07**	.00	.01**	.00	.04**	.00	.01*	.00	.03**	.00	.01**	.00

Note.  $N = 1,539$ . SWB = subjective well-being; SCS = self-control school; SCI = self-control interpersonal. Self-control variables were added to the regression equation after controls (gender, school, ethnicity, extraversion, Agreeableness, Openness, and Neuroticism);  $\Delta R^2$  denotes self-control variables over and above controls (and self-control main effects for squared terms) Bonferroni-corrected  $p$ -values: \* $p < .004$ . \*\* $p < .0008$



**TABLE 2** Study 2 standardized regression coefficients of self-control variables on SWB

	Positive Affect				Negative Affect				Life Satisfaction			
	Self-Report		Teacher Report		Self-Report		Teacher Report		Self-Report		Teacher Report	
	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$
SCS	.05	.06	.14**	.19**	-.09	-.09		-.09	.13**	.14*	.07	.11
SCS <sup>2</sup>		.01		.07		.01		.13*		.01		.06
R <sup>2</sup>	.32**	.32**	.34**	.34**	.35**	.35**	.35**	.36**	.26**	.26**	.25**	.25**
$\Delta R^2$	.00	.00	.02**	.00	.01	.00	.00	.01*	.01**	.00	.00	.00
SCI	.03	.02	.03	.17	-.09	-.11	-.04	.01	.11	.20**	.02	.02
SCI <sup>2</sup>		-.01		.17		.05		-.06		-.14*		.00
R <sup>2</sup>	.32**	.32**	.32**	.33**	.35**	.35**	.35**	.35**	.25**	.26**	.25**	.25**
$\Delta R^2$	.00	.00	.00	.01	.01	.00	.00	.00	.01	.01*	.00	.00

Note.  $N = 667$ . SWB = subjective well-being; SCS = self-control school; SCI = self-control interpersonal. Self-control variables were added to the regression equation after controlling for gender, school, ethnicity, Extraversion, Agreeableness, Openness, and Neuroticism;  $\Delta R^2$  denotes self-control variables over and above controls (and self-control main effects for squared terms) Bonferroni-corrected  $p$ -values: \* $p < .004$ . \*\* $p < .0008$

relationship between teacher-reported self-control (both school and interpersonal) and life satisfaction, as all three relied on a single-item measure. The results of the 10 remaining analyses mirrored the earlier results in that there was evidence of a linear relationship between self-control and SWB, but no evidence of a quadratic effect.

### 3 | STUDY 2

Study 1 found a linear relationship between self-control and SWB on 11 of 12 tests, indicating a consistent association. The more that students possessed self-control (as rated by themselves and their teachers), the more they experienced positive affect and negative affect and were satisfied with their lives. There was no indication of a curvilinear effect. Study 2 aimed to replicate these effects using slightly different measurements to ensure that the effects of Study 1 were not dependent on specific measures.

### 3.1 | Method

#### 3.1.1 | Participants

Participants were 667 sixth- through eighth-grade students (52.8% female) enrolled in three schools in the United States. On average, students in these grades range between 11 and 14 years old. The sample included African American (26%), Caucasian (24%), Hispanic (45%), Asian (3%), and multiracial (2%) students.

#### 3.1.2 | Measures

##### Self-control

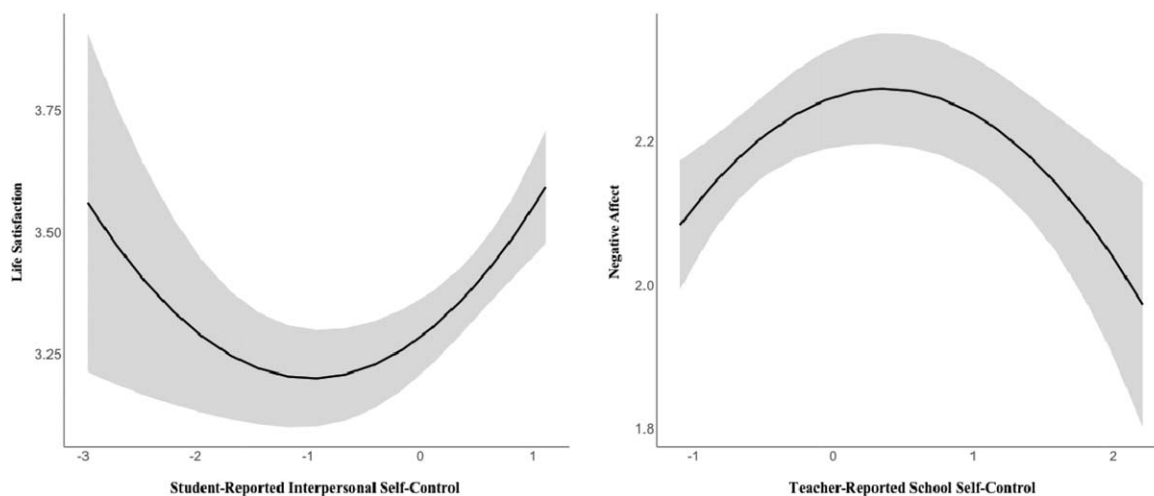
Using the same scale as in Study 1, students self-rated their school ( $\alpha = .63$ ) and interpersonal ( $\alpha = .72$ ) self-control with four items each. Unlike Study 1, teachers were asked to report students' self-control using the same eight-item measure as the students. Also, although teachers did rate several students, each student was only rated once. We found sufficient internal consistency reliability for teacher ratings of both school ( $\alpha = .91$ ) and interpersonal ( $\alpha = .89$ ) self-control. Student and teacher ratings were moderately correlated for both school ( $r = .24$ ,  $p < .01$ ) and interpersonal ( $r = .37$ ,  $p < .01$ ) self-control.

##### Subjective well-being

Using the Positive and Negative Affect Scale for Children (PANAS-C; Laurent et al., 1999), students rated 15 positive and 15 negative emotions (e.g., delighted, active, afraid) on 5-point Likert scales (1 = *Very slightly or not at all*, 5 = *Extremely*). Both positive ( $\alpha = .87$ ) and negative affect ( $\alpha = .88$ ) were internally consistent. We assessed life satisfaction using the five-item Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). Students were asked to rate their current life satisfaction (e.g., "In most ways my life is close to my ideal," "The conditions of my life are excellent") on a 5-point Likert scale (1 = *Disagree strongly*, 5 = *Agree strongly*), which yielded good reliability ( $\alpha = .80$ ).

##### Statistical controls

Our analyses controlled for gender, school, and ethnicity. We also controlled for student-reported Extraversion (8



**FIGURE 1** Study 2 curvilinear relations for (a) student-reported interpersonal self-control and life satisfaction and (b) teacher-reported school self-control and negative affect

items;  $\alpha = .66$ ), Agreeableness (9 items;  $\alpha = .68$ ), Openness (10 items;  $\alpha = .70$ ), and Neuroticism (8 items;  $\alpha = .70$ ) measured via the BFI-44 (John & Srivastava, 1999).

### 3.2 | Results

We conducted 12 regression analyses and used Bonferroni corrections for significance thresholds (.004 for  $\alpha = .05$ ; .0008 for  $\alpha = .01$ ). Results (Table 2) produced only two significant main effects: students' self-reports of school self-control and life satisfaction ( $\beta = .13$ ,  $p < .0008$ ) and teacher ratings of students' school self-control and positive affect ( $\beta = .14$ ,  $p < .0008$ ).

Additionally, student ratings of interpersonal self-control showed a significant quadratic effect on life satisfaction ( $\beta = -.14$ ,  $p < .004$ ); likewise, teacher ratings of school self-control had a significant quadratic effect on negative affect ( $\beta = .13$ ,  $p < .004$ ). However, the shape of the curves did not reflect the “too much of a good thing” effect (Figure 1).

We also used an ideal point modeling scoring approach on all self-control (i.e., both student and teacher reports) and SWB (i.e., positive affect, negative affect, life satisfaction). These results replicated the linear effects, and there was no evidence of a “too much of a good thing” effect.

## 4 | STUDY 3

Although Study 1 found a linear association between self-control and SWB, the evidence for the linear effect was less strong in Study 2. Further, there was no evidence that more self-control would result in worse SWB. Study 3 was conducted to test the competing hypotheses again, and thus was another replication attempt.

## 4.1 | Method

### 4.1.1 | Participants

Participants were 1,386 12th-grade students ( $M_{\text{age}} = 17.98$ ,  $SD = .55$ ; 51.1% female) from three U.S. schools. The ethnic breakdown of the sample was African American (31%), Caucasian (36%), Hispanic (11%), Asian (20%), and multiracial (2%).

### 4.1.2 | Measures

#### Self-control

Study 3 used the school (four items;  $\alpha = .68$ ) and interpersonal (four items;  $\alpha = .72$ ) self-control scales from Study 1 (Tsukayama et al., 2013). Teacher ratings for self-control were gathered in the same manner as in Study 1. Two teachers for each student answered one item tapping the student's self-control at school ( $r_{\text{wg}} = .53$ ) and one item tapping the student's interpersonal self-control ( $r_{\text{wg}} = .61$ ). We averaged the scores across teachers. Correlations between student and teacher ratings of self-control were  $r = .22$ ,  $p < .01$ , for school self-control and  $r = .19$ ,  $p < .01$ , for interpersonal self-control.

#### Subjective well-being

We also measured SWB similarly to Studies 1 and 2. Participants responded to five positive items (e.g., happy, elated, excited) and five negative items (e.g., sad, worried, angry) to assess positive ( $\alpha = .79$ ) and negative ( $\alpha = .74$ ) affect, respectively. The students answered one life satisfaction question, “Overall, how satisfied are you with your life,” on a 7-point Likert scale (1 = *Extremely Unsatisfied*, 7 = *Extremely Satisfied*).

#### Statistical controls

Analyses also controlled for gender, school, ethnicity, Extraversion ( $\alpha = .75$ ), Agreeableness ( $\alpha = .68$ ), Openness ( $\alpha = .69$ ),

**TABLE 3** Study 3 standardized regression coefficients of self-control variables on SWB

	Positive Affect				Negative Affect				Life Satisfaction			
	Self-Report		Teacher Report		Self-Report		Teacher Report		Self-Report		Teacher Report	
	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$
SCS	.15**	.15**	.00	.00	-.12**	-.11**	-.03	-.04	.18**	.19**	.03	.04
SCS <sup>2</sup>		.03		.00		.04		-.02		.03		.03
R <sup>2</sup>	.35**	.35**	.34**	.34**	.49**	.49**	.47**	.47**	.19**	.19**	.16**	.16**
$\Delta R^2$	.02**	.00	.00	.00	.01**	.00	.00	.00	.03**	.00	.00	.00
SCI	.05	.04	-.02	-.02	-.10**	-.09**	.03	.02	.06	.05	-.02	.03
SCI <sup>2</sup>		-.03		-.01		.02		-.02		-.03		.07
R <sup>2</sup>	.34**	.34**	.34**	.34**	.48**	.48**	.47**	.47**	.16**	.16**	.16**	.16**
$\Delta R^2$	.00	.00	.00	.00	.01**	.00	.00	.00	.00	.00	.00	.00

Note.  $N = 1,386$ . SWB = subjective well-being; SCS = self-control school; SCI = self-control interpersonal. Self-control variables were added to the regression equation after controls (gender, school, ethnicity, Extraversion, Agreeableness, Openness, and Neuroticism);  $\Delta R^2$  denotes self-control variables over and above controls (and self-control main effects for squared terms) Bonferroni-corrected  $p$ -values: \* $p < .004$ . \*\* $p < .0008$

and Neuroticism ( $\alpha = .78$ ). The latter four were measured using four selected items (16 total) from the BFI-44 (John & Srivastava, 1999).

## 4.2 | Results

Bonferroni corrections on 12 regression analyses resulted in significance thresholds of .004 (for  $\alpha$  at .05) and .0008 (for  $\alpha$  at .01). Regression results (Table 3) demonstrated that whereas

student ratings of school self-control predicted all three components of SWB, student ratings of interpersonal self-control only predicted negative affect ( $\beta = -.10$ ,  $p < .0008$ ). None of the teacher ratings of students' self-control significantly predicted SWB. Most important, adding a quadratic term to the models did not account for additional variance in any of the SWB measures. We conducted ideal-point scoring of self-reported self-control as well as positive and negative affect. These models did not reveal any significant inverted-U effects.

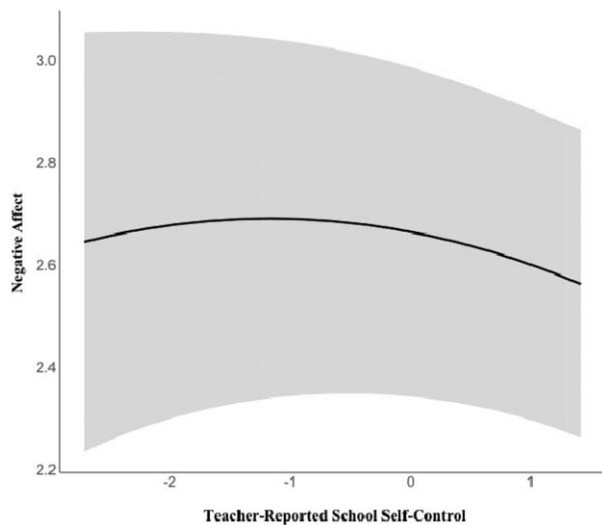
**TABLE 4** Studies 1–3 effect size estimates of self-control variables on SWB using integrative data analysis

	Positive Affect				Negative Affect				Life Satisfaction			
	Self-Report		Teacher Report		Self-Report		Teacher Report		Self-Report		Teacher Report	
	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$
SCS	.14*	.15**	.08*	.09*	-.11**	-.11**	-.03	-.05	.17**	.17**	.07*	.08*
SCS <sup>2</sup>		.01		.01		.01		-.02*		-.01		.01
R <sup>2a</sup>	.36**	.36**	.31**	.31**	.42**	.42**	.40**	.40**	.22**	.22**	.19**	.19**
$\Delta R^{2a}$	.06	.00	.01	.00	.03	.00	.01	.00	.03	.00	.00	.00
SCI	.11*	.11*	.03	.05	-.12**	-.13**	-.01	-.02	.11**	.11**	.04	.05
SCI <sup>2</sup>		.01		.02		.00		.00		.00		.01
R <sup>2a</sup>	.32**	.32**	.30**	.30**	.41**	.41**	.40**	.40**	.20**	.20**	.19**	.19**
$\Delta R^{2a}$	.02	.00	.00	.00	.02	.00	.01	.00	.01	.00	.00	.00

Note. Values are unstandardized parameter estimates. SWB = subjective well-being; SCS = self-control school; SCI = self-control interpersonal. Self-Control variables were added to the regression equation after controlling for gender, ethnicity, Extraversion, Agreeableness, Openness, and Neuroticism;  $\Delta R^2$  denotes self-control variables over and above controls (and self-control main effects for squared terms)

<sup>a</sup>R<sup>2</sup> is the conditional R<sup>2</sup>, which explains the proportion of variance explained by random and fixed factors

\* $p < .05$ . \*\* $p < .01$



**FIGURE 2** IDA curvilinear relations for teacher-reported school self-control on negative affect

### 4.3 | Studies 1–3 discussion

Studies 1–3 found indications of a linear relationship between self-control and SWB—but no quadratic effects. In order to make stronger claims, we conducted an integrative data analysis (IDA; Curran & Hussong, 2009). IDA allows for pooling data across different samples, which can increase the power to detect relationships beyond that of an individual study. We harmonized the measures (e.g., transforming all items to be on the same scale), integrated the data sets, and created scale means of each construct using observed item scores (as recommended by Bainter & Curran, 2015; Curran & Hussong, 2009). We then assigned each student a corresponding Study ID and conducted hierarchical linear modeling (HLM) with Study ID as a Level 2 random effect.

The results from the IDA are reported in Table 4 using traditional significance values. There were clear, consistent linear effects between students' self-reported self-control scores and SWB after controlling for demographic and psychographic variables (as reported in Studies 1–3). Additionally, some teacher reports of students' self-control significantly predicted SWB. Most importantly, there was no evidence of a significant inverted-U effect. That is, neither teacher ratings nor student self-ratings indicated that students with very high self-control are less happy than others. The one significant quadratic effect between teacher-reported school self-control and negative affect was not in the expected direction (Figure 2).

## 5 | STUDY 4

Studies 1–3 found no evidence of a downturn in SWB at high levels of trait self-control. One possible objection is that self- or informant reports of self-control are biased. Study 4 therefore used a behavioral measure of self-control called the

Academic Diligence Task (ADT). The ADT presents participants with the ongoing choice between working toward academic goals (e.g., practicing math or spelling) and doing fun, rewarding activities (e.g., playing a video game or watching YouTube videos). This measure aptly captures one possible route by which self-control could reduce SWB because high scores require foregoing pleasures for the sake of work. If scoring very high on the ADT indicates a joyless, duty-bound approach to life, it might well lead to lower SWB.

## 5.1 | Method

### 5.1.1 | Participants

Participants were 1,280 ninth-grade students ( $M_{age} = 14.89$ ,  $SD = .47$ ; 50.4% female) from eight schools in the United States. The sample was composed of African American (45%), Caucasian (26%), Hispanic (16%), Asian (12%), and multiracial (1%) students. A subsample of students completed the ADT ( $n = 300$ ), a behavioral measure of self-control.

### 5.1.2 | Measures

#### Self-control

Students completed the same items for school and interpersonal self-control as in Study 1 (Tsukayama et al., 2013), plus an additional item for each domain (i.e., five items total per domain). Both school ( $\alpha = .77$ ) and interpersonal ( $\alpha = .79$ ) self-control demonstrated good reliability.

Teacher ratings of student self-control were gathered in the same manner as in Study 1. On average, the 59 teachers rated approximately 91 students each on both school and interpersonal self-control. We calculated  $r_{wg}$  for both school (.75) and interpersonal (.70) self-control and averaged ratings to create overall scores for each.

#### Academic Diligence Task

The ADT is a Web-based computerized task designed to mirror real-world situations where a student must make the difficult decision of completing an easy but tedious skill-building task (i.e., single-digit subtraction for the math domain; spelling for the verbal domain; navigation for the spatial domain) while foregoing entertaining distractions (e.g., viewing music videos, movie trailers, and sports highlights, or playing Tetris). After explaining the importance of the skill-building task, students interact (across three, 3-minute blocks) with a split-screen interface that provides them with the choice to either complete the skill-building activity or engage with the distractors. The dependent variable is the percent of time spent on the skill-building activity (time on task) and how many skill-building tasks they answered correctly (productivity).



**TABLE 5** Study 4 standardized regression coefficients of self-control (self-/teacher reports) variables on SWB

	Positive Affect				Negative Affect				Life Satisfaction			
	Self-Report		Teacher Report		Self-Report		Teacher Report		Self-Report		Teacher Report	
	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$
SCS	.27**	.27**	.12**	.11**	-.21**	-.20**	-.08	-.08	.19**	.19**	.12**	.12**
SCS <sup>2</sup>		.01		-.03		.04		.03		.02		.01
R <sup>2</sup>	.11**	.11**	.05**	.05**	.15**	.15**	.12**	.12**	.09**	.09**	.07**	.07**
$\Delta R^2$	.07**	.00	.01**	.00	.04**	.00	.01	.00	.03**	.00	.01**	.00
SCI	.30**	.29**	.10*	.09*	-.25**	-.25**	-.06	-.06	.21**	.22**	.09*	.10*
SCI <sup>2</sup>		-.04		-.04		-.01		.01		.02		.03
R <sup>2</sup>	.12**	.12**	.05**	.05**	.17**	.17**	.11**	.11**	.10**	.10**	.06**	.06**
$\Delta R^2$	.08**	.00	.01*	.00	.05**	.00	.00	.00	.04**	.00	.01	.00

Note.  $N = 1,280$ . SWB = subjective well-being; SCS = self-control school; SCI = self-control interpersonal. Self-control variables were added to the regression equation after controls (gender, school, and ethnicity);  $\Delta R^2$  denotes self-control variables over and above controls (and self-control main effects for squared terms) Bonferroni-corrected  $p$ -values: \* $p < .003$ . \*\* $p < .0006$

### Subjective well-being

Subjective well-being was measured with three indices: positive affect, negative affect, and life satisfaction. Positive and negative affect were measured (1 = *Never*, 5 = *Always*) using four and six items (Diener et al., 2009), respectively. Participants indicated how often in the past month they felt good, happy, joyful, and satisfied ( $\alpha = .82$ ). Negative affect was measured using six items (Diener et al., 2009). Participants were asked how often they felt bad, sad, afraid, angry, worried, and stressed ( $\alpha = .79$ ). Life satisfaction was measured with a single item ("How satisfied or unsatisfied were you with your life?") on a 6-point Likert scale (1 = *Strongly unsatisfied*, 6 = *Strongly satisfied*).

### Statistical controls

We used gender, school, and ethnicity as controls.

## 5.2 | Results

The Bonferroni corrections for the 18 regression analyses resulted in significance targets of .003 (for  $\alpha$  at .05) and .0006 (for  $\alpha$  at .01). Parallel to the IDA conducted on Studies 1–3, both self-report self-control measures significantly predicted positive affect, negative affect, and life satisfaction (Table 5). Teacher reports of student self-control predicted positive affect and life satisfaction, but not negative affect. Neither metric of self-control from the Academic Diligence Task (productivity, time on tasks) predicted SWB (Table 6).

Most central to our article, the addition of the squared term to test the curvilinear effects between self-control and SWB revealed no significant effects. Rerunning the models after using the ideal point modeling scoring approach on

self-reported self-control ratings as well as positive and negative affect revealed no significant curvilinear effects.

## 5.3 | Discussion

As in Studies 1–3, Study 4 provided strong support that perceptions of self-control were linearly related to SWB with no downturn. When we assessed self-control using other methods, such as teacher ratings and the behavioral task, there was less

**TABLE 6** Study 4 standardized regression coefficients of self-control (ADT) variables on SWB

	Positive Affect		Negative Affect		Life Satisfaction	
	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$
Productivity	.00	.04	-.02	-.04	.13	.17
Productivity <sup>2</sup>		-.08		.05		-.08
R <sup>2</sup>	.07	.07	.14**	.14**	.09	.10
$\Delta R^2$	.00	.00	.00	.00	.01	.01
Task time	-.02	-.01	-.01	-.01	.12	.12
Task time <sup>2</sup>		-.16		.03		-.07
R <sup>2</sup>	.07	.09	.14**	.14**	.09	.09
$\Delta R^2$	.00	.02	.00	.00	.01	.00

Note.  $N = 300$ . ADT = Academic Diligence Task; SWB = subjective well-being. Self-control variables (i.e., productivity and task time) were added to the regression equation after controlling for gender, school, and ethnicity;  $R^2$  denotes self-control variables over and above controls (and self-control main effects for squared terms) Bonferroni-corrected  $p$ -values: \* $p < .003$ . \*\* $p < .0006$

evidence of a relationship between self-control and SWB. More importantly, we did not find the inverted-U effect, which could conceal the lack of a positive relationship.

The behavioral measure of self-control likewise failed to show any sign of a curvilinear relationship to SWB. However, it also failed to find the linear relationship that has been robust across self-report measures. The lack of a positive relationship suggests two possibilities. First, the task may be too specific, and doing well on the specific task may not generalize to broader life domains to affect SWB. Second, the task may demonstrate that behavioral measures of self-control are not related to SWB. This would imply that there is some degree of global positivity bias—individuals who view themselves as having greater self-control also view themselves as happy. Study 5 was designed to tease these apart.

## 6 | STUDY 5

The failure of the behavioral measure in Study 4 to yield results comparable to those of the self-report measures raises the possibility of a global positivity bias in aggregate self-reports. Study 5 aimed to minimize that problem by using the Day Reconstruction Method (DRM; Kahneman et al., 2004), which has people list activities during different segments of their day. We had them rate their SWB during each event.

### 6.1 | Method

#### 6.1.1 | Participants

We tested 320 college undergraduates ( $M_{\text{age}} = 19.33$ ,  $SD = 1.38$ ; 48% female). The sample was composed of African American (4%), Caucasian (72%), Hispanic (3%), Asian (17%), Native American (1%), and multiracial (3%) individuals.

#### 6.1.2 | Measures

##### Self-control

We used four measures to assess self-control. Participants completed the 36-item Self-Control Scale (Tangney et al., 2004), the 30-item Barratt Impulsiveness Scale Version 11 (BIS-11; Patton, Stanford, & Barratt, 1995), the 12-item Delay of Gratification Scale (Ray & Najman, 1986), and the 10-item Academic Delay of Gratification Scale (Bembunty & Karabenick, 1998). Each measure demonstrated acceptable internal consistency ( $\alpha = .97, .83, .74, .69$ , respectively).

##### Subjective well-being

We measured the affective components of SWB in two ways. First, participants completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) before engaging in the DRM. The PANAS presented 10

mood states of each valence (positive affect,  $\alpha = .88$ ; negative affect,  $\alpha = .89$ ). Second, we calculated positive and negative affect using the DRM (Kahneman et al., 2004). Using this method, participants split the previous day into three parts: morning, afternoon, and evening. Within these three parts, they listed as many events as they could think of, as well as the time the event began and ended. For each event, they rated on a scale ranging from 0 to 10 how much they felt each of the 14 positive affect states (e.g., excited, serene, active, proud) and 16 negative affect states (e.g., upset, guilty, bored). These affective responses were subsequently weighted by how long the event lasted to create a single score for positive and negative affect.

### Controls

We controlled for age, gender, and ethnicity.

## 6.2 | Results

Bonferroni corrections stipulated significance thresholds of .003 (for  $\alpha = .05$ ) and .0006 (for  $\alpha = .01$ ) for the 16 regression analyses. For PANAS measures, self-control indices significantly predicted both positive and negative affect (Table 7), with the exception that delay of gratification did not significantly predict self-reported positive affect ( $\beta = .15$ ,  $p > .003$ ). Furthermore, all self-control measures significantly predicted negative affect using the DRM, but they did not predict positive affect.

Crucially, no significant curvilinear effects were found in these analyses and after estimating self-reported positive and negative affect (via PANAS) and all four measures of self-control using ideal-point modeling scoring.

## 6.3 | Discussion

The DRM was employed to overcome potential biases in global assessments of self-control and SWB. Nonetheless, and consistent with Studies 1–4, Study 5 found no evidence for a curvilinear relationship between self-control and SWB.

The linear positive relationship between self-control and SWB was once again found in Study 5, especially with self-report measures. The four self-control scales predicted both traditional self-reported and DRM negative affect, but not DRM positive affect. Although DRM positive affect was significantly correlated with self-reported positive affect ( $r = .34$ ,  $p < .01$ ), it was not significantly correlated with any of the self-control measures. These findings suggest that self-control may not produce positive affect in the moment, whereas engaging in self-control may reduce negative feelings.

Still, the main finding is that there was no sign that high levels of self-control bring a downturn in SWB. Study 5

**TABLE 7** Study 5 standardized regression coefficients of self-control variables on SWB

	Positive Affect				Negative Affect			
	Self-Report		DRM		Self-Report		DRM	
	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$	$\beta_{\text{Step 1}}$	$\beta_{\text{Step 2}}$
SC	.34**	.33**	.11	.11	-.48**	-.47**	-.37**	-.37**
SC <sup>2</sup>		.06		.04		-.06		.03
R <sup>2</sup>	.16**	.17**	.08*	.08*	.32**	.33**	.23**	.23**
$\Delta R^2$	.11**	.01	.01	.00	.22**	.01	.13**	.00
IMP	-.25**	-.24**	-.09	-.09	.32**	.32**	.28**	.28**
IMP <sup>2</sup>		.02		-.03		-.02		-.03
R <sup>2</sup>	.11**	.11**	.08*	.08*	.20**	.20**	.18**	.18**
$\Delta R^2$	.06**	.00	.01	.00	.10**	.00	.08**	.00
DOG	.15	.15	.11	.11	-.26**	-.28**	-.24**	-.25**
DOG <sup>2</sup>		.04		.01		-.10		-.05
R <sup>2</sup>	.07	.07	.08*	.08*	.17**	.18**	.16**	.16**
$\Delta R^2$	.02	.00	.01	.00	.07**	.01	.06**	.00
ADOG	.31**	.31**	.09	.09	-.26**	-.26**	-.24**	-.24**
ADOG <sup>2</sup>		.11		.06		-.06		.03
R <sup>2</sup>	.14**	.15**	.08*	.08*	.17**	.17**	.15**	.15**
$\Delta R^2$	.09**	.01	.01	.00	.07**	.00	.05**	.00

Note.  $N = 320$ . SWB = subjective well-being; DRM = Day Reconstruction Method; SC = self-control; IMP = impulsivity; DOG = delay of gratification; ADOG = academic delay of gratification. Self-control variables were added to the regression equation after controlling for gender, age, and ethnicity;  $\Delta R^2$  denotes self-control variables over and above controls (and self-control main effects for squared terms) Bonferroni-corrected  $p$ -values: \* $p < .003$ . \*\* $p < .0006$

ruled out the alternative interpretation that the linear relationship between self-reported SWB and self-control reflects a positivity bias in one-shot aggregate self-report measures, because it still emerged with the DRM.

## 7 | STUDY 6

Studies 1–5 tested our hypothesis across a developmental span of fifthgrade students through young adults. Study 6 further extended the investigation to a community sample of adults. We analyzed data from the Everyday Temptations Study (Hofmann et al., 2012), which applied an experience sampling method (ESM) to capture self-control episodes in daily life. The use of ESM rules out the possible influence of lay theories that may be present in global judgments (in Studies 1–3). In particular, traditional self-report survey data are dependent on reconstructive judgments, which may be influenced by existing lay theories of the universal “goodness” of self-control. This may result in an artificial linear

effect between self-control and happiness and mask the true underlying inverted-U effects. Because momentary assessments are focused on specific events, they would be less prone to these biases (Hektner, Schmidt, & Csikszentmihalyi, 2007).

Hence, this approach offered our best hope for finding evidence for an inverted-U relationship between self-control and SWB.

### 7.1 | Method

#### 7.1.1 | Participants

As described in Hofmann et al. (2012), the sample consisted of 205 adults (66% female) from Würzburg, Germany. Participants ranged from 18 to 55 years old ( $M = 25.24$ ,  $SD = 6.32$ ). Participants were given €20, with an additional incentive of movie passes (€15) if they completed 80% of the signals as well as entrance into a raffle for one of two portable music players (iPod Touch).

### 7.1.2 | Procedure

Participants were provided with Blackberry personal data assistants (PDAs) for 7 consecutive days (for a detailed overview of the procedure, see Hofmann et al., 2012). Each day, they received seven signals to the PDA and completed an experience-sampling protocol designed to assess whether they were experiencing any desires and whether they used self-control to resist their desires.

### 7.1.3 | Measures

#### Self-control

Self-control was measured both at the person and event level. Before completing the ESM part of the study, participants completed the 13-item version of the Trait Self-Control Scale (Tangney et al., 2004;  $\alpha = .87$ ). Additionally, event-level self-control was measured by having participants rate how successful they were at resisting a given desire using a 6-point Likert scale. Importantly, in order to receive this question, participants needed to have indicated that they experienced a temptation within the previous half hour and that they had tried to resist it. Further findings regarding TSC's effects on a broader set of constructs are reported in Hofmann et al. (2012).

#### Subjective well-being

SWB was also measured at both the person and event level. Prior to the experience sampling portion of the study, participants completed the five-item Satisfaction With Life Scale (Diener et al., 1985;  $\alpha = .80$ ). The event-level indication of SWB was a single item concerning their momentary affective well-being rated on a 7-point Likert scale (1 = *very bad*, 7 = *very good*).

#### Controls

We controlled for several demographic variables (age, gender, nationality) and used a German adaptation of the brief Ten-Item Personality Measure (Gosling, Rentfrow, & Swann, 2003) to measure Extraversion ( $\alpha = .63$ ), Neuroticism ( $\alpha = .75$ ), Agreeableness ( $\alpha = .14$ ), and Openness ( $\alpha = .54$ ).

## 7.2 | Results

We used three approaches to examine the data. With the person-level data, we investigated the potential curvilinear relationship between trait self-control and life satisfaction. Results from the hierarchical linear regression analysis demonstrated a significant linear effect ( $\beta = .38, p < .01$ ), but not a significant curvilinear effect ( $\beta = .06, p > .05$ ). The ideal-point scoring replicated the results with respect to a linear effect but indicated no inverted-U effect.

Given that the event-level data were nested within individuals, hierarchical linear modeling (HLM) assessed the relation between both momentary self-control (i.e., self-control success; ) and self-control success aggregated to the person level (i.e., ), where  $j$  represents the person and  $i$  represents the event. To disentangle momentary effects from aggregated effects, we conducted group-mean centering of momentary self-control (i.e., an individual's momentary self-control score minus the average of the same individual's momentary self-control scores; Enders & Tofighi, 2007). The quadratic scores were calculated from the group-mean-centered self-control success variable (i.e.,  $[SCS_{ij} - (\overline{SCS}_j)]^2$ ) and the aggregated self-control variable (i.e.,  $\overline{SCS}_j^2$ ).

$$\text{Level 1 : } SWB_{ij} = \beta_{0j} + \beta_{1j}(SCS_{ij} - \overline{SCS}_j) + \beta_{2j}([SCS_{ij} - \overline{SCS}_j]^2) + r_{ij} \quad (1)$$

$$\text{Level 2 : } \beta_{0j} = \gamma_{00j} + \gamma_{01}(\overline{SCS}_j) + \gamma_{02}(\overline{SCS}_j^2) + \mu_{0j} \quad (2)$$

$$\beta_{1j} = \gamma_{10j} + \mu_{1j} \quad (3)$$

$$\beta_{2j} = \gamma_{20j} + \mu_{2j} \quad (4)$$

Additional controls in Equation 2 including gender, age, and personality (Extraversion, Agreeableness, Neuroticism, Openness) were also included but not displayed in the equations for simplicity.

We used the lme4 (Bates, Maechler, Bolker, & Walker, 2015) in R to run these models. Due to the multilevel nature of the data, we estimated a conditional  $R$ , which explains the proportion of variance explained by both random and fixed factors. Results from these analyses are presented in Table 8. Aggregated self-control success significantly predicted average momentary SWB (at Level 2 of the model); however, the quadratic term was not significant. Additionally, we found a significant linear relationship between momentary self-control success and momentary SWB (at Level 1), as well as a significant quadratic effect; however, it was not in the shape of an inverted-U relationship (Figure 3).

We also used multiple regression analysis to test whether aggregated self-control success at the person level predicted participants' scores on the Satisfaction With Life Scale as an alternative measure of SWB. Again, the linear term was significant ( $\beta = .21, p < .01$ ), whereas the quadratic term was not ( $\beta = -.07, p > .05$ ). Last, a bootstrapping mediation analysis (Preacher & Hayes, 2004) established that aggregated self-control success partially mediated the above relationship between dispositional self-control (TSC) and SWB as measured with the Satisfaction With Life Scale, as indicated by a reliable indirect effect ( $\beta = .03$ ; 95% confidence interval  $> 0$ ).

## 7.3 | Discussion

Study 6 used ESM to overcome potential biases associated with self-report data. Further, this study extends the previous

**TABLE 8** Study 6 multilevel models for testing the effects of self-control successes on momentary affective well-being

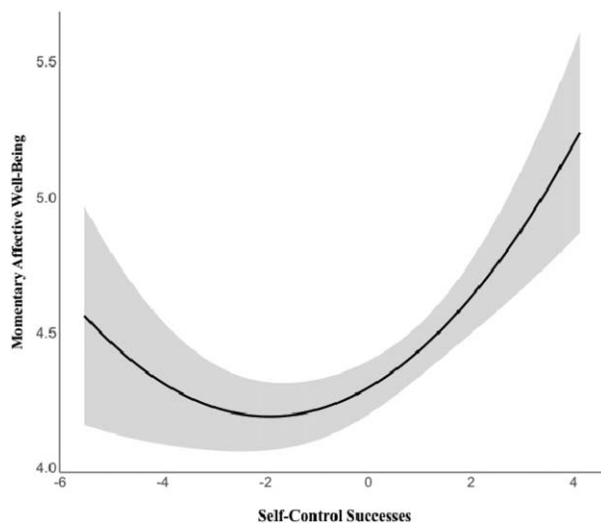
Fixed effects		Momentary Affective Well-Being	
		Step 1	Step 2
Level 2	$\overline{SCS}_j(\gamma_{01})$	.08	.13**
	$\overline{SCS}_j^2(\gamma_{02})$		.04
Level 1	$(SCS_{ij} - \overline{SCS}_j)(\gamma_{10})$	.07**	.11**
	$[SCS_{ij} - \overline{SCS}_j]^2(\gamma_{20})$		.03**
Variance components			
Intercept variance		.34	.34
SCS slope variance		.02	.02
$R^{2a}$		.24**	.24**
$\Delta R^{2a}$		.05	.00

Note.  $N = 205$  subjects (Level 2);  $N = 3,192$  events (Level 1). SCS = self-control successes. Self-control successes variables ( $\overline{SCS}_j$ ;  $(SCS_{ij} - \overline{SCS}_j)$ ) were added to the model after controlling for gender, age, nationality, and personality;  $\Delta R^2$  denotes self-control variables over and above controls (and self-control main effects for squared terms)

<sup>a</sup> $R^2$  is the conditional  $R^2$ , which explains the proportion of variance explained by random and fixed factors

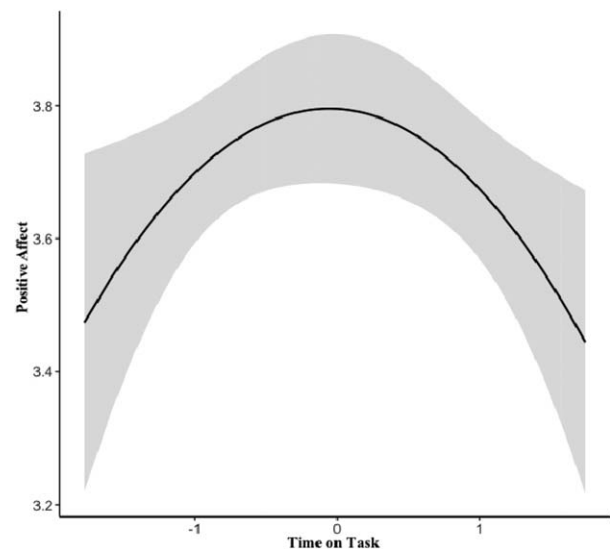
\* $p < .05$ . \*\* $p < .01$

studies by using a sample of adults. We found consistent evidence of a linear effect of self-control on SWB with person-level (i.e., trait self-control and aggregated self-control successes) and event-level (i.e., self-control success) data. But once again, there was no evidence of an inverted-U relation.

**FIGURE 3** Study 6 curvilinear relations for self-control successes and momentary affective well-being

## 8 | SUPPLEMENTARY REANALYSIS

Conducting Bonferroni corrections may be too conservative and increases the likelihood of Type II errors (Perneger, 1998). To address this possibility, we reran all of our analyses without any corrections to the traditional significance criteria of  $\alpha = .05$ . However, even when using this criterion, only two significant quadratic terms resembled the expected pattern. Using the uncorrected .05, Study 1 yielded a significant quadratic effect between self-reported self-control successes (SCS) and life satisfaction ( $\beta = -.06$ ,  $p < .05$ ). Happiness increased with school self-control up to a point and then leveled off. It was never detrimental, and so this analysis failed to show too much of a good thing—merely enough of a good thing, consistent with the notion of diminishing returns from continuing to exercise ever higher levels of self-discipline in schoolwork. The other significant quadratic effect was found in Study 4 with the relationship between time on the ADT and positive affect ( $\beta = -.11$ ,  $p < .05$ ). This effect is the most representative of the inverted-U shape (Figure 4), as participants who spent more time on a task began to report less positive affect after a certain point. We are reluctant to place much evidence on this isolated finding, not least because the ADT generally yielded little, and this finding could also suggest that refusing all the pleasures on offer during the ADT might have primed the view of the self as not having fun. Moreover, in terms of effect size, the quadratic terms in both of these cases accounted for 1% or less of the incremental variance in SWB. In general, there does not seem to be strong evidence of inverted-U effects for SWB even when not controlling for multiple comparisons.

**FIGURE 4** Study 4 curvilinear relations for time on task and positive affect



## 9 | GENERAL DISCUSSION

This investigation answered the call of Grant and Schwartz (2011) to investigate “the inverted U” in positive psychology contexts. Although those authors suggested that such studies may identify cases when you can have too much of a good thing, our results suggest that too much self-control is not one of these, at least with regard to SWB. Across six studies employing multiple samples, methods, and measures, we found no support for the inverted-U effect of self-control on SWB. These results echo prior investigations that have studied other aspects of well-being (e.g., depression, stress, social relationships; Finkenauer et al., 2005; Tangney et al., 2004) and lend support to the functional perspective of self-control. Apparently, the more self-control people have, the happier they are, at least within the bounds tested in these studies.

From an evolutionary perspective, natural selection favored self-control insofar as it improved survival and reproduction—and the same for subjective feelings of pleasure. Self-control helps individuals succeed and thrive, and these successes bring happiness. Hence, they should be (and are, in our data) positively correlated. Too much self-control would only reduce SWB if it led to fewer positive outcomes. The human mind differs from most other animals in its ability to project into the future, and so people can modify current behavior to bring later benefits. Although self-control often involves foregoing immediate pleasure, these sacrifices may be rewarded in the long run. Our findings suggest that such benefits outweigh the loss of in-the-moment pleasures for an overall higher SWB.

The goal of the present investigation was to test the potential curvilinear effects of self-control conceptualized as a virtue. Often, high levels of self-control are intuitively associated with concepts such as dysfunctional perfectionism (i.e., rigid adherence to unreachable standards) or obsessive-compulsive tendencies. However, we believe these represent the inappropriate application of self-regulation (e.g., regulation when not faced with temptation) and may actually be indicative of less self-control.

Crucially, the present study was one of the first to investigate the inverted-U relationship between self-control and SWB using diverse measures and methods. Despite many variations in measures and procedures, we found very consistent patterns across the six studies: SWB does not appear to decline as self-control increases, even at the highest levels. There are several implications of these findings.

First, given that greater self-control is associated with higher SWB (rather than lower), our results provide preliminary support for promoting self-control among school-age children. This is because the potential downturn in happiness could present a dilemma for those designing self-control

interventions, as they would have to balance the trade-off between improved academic success (Tangney et al., 2004) and decreases in a student’s well-being. However, our results suggest that self-control interventions could improve not only academic success but also SWB.

Second, as the monotonic trend between self-control and SWB holds in a general adult population (Study 6), it may also be worthwhile for organizational policy makers to look into the development of worker self-control. As self-control tendencies are generally linked to better performance (e.g., Steel, Brothen, & Wambach, 2001), self-control interventions may have the added effect of improving worker SWB.

Third, as self-control is frequently regarded as the “master virtue” that underlies other virtues (Baumeister & Exline, 1999), these findings may generalize to other types of positive character traits and virtues in that their growth and development may be associated with greater SWB, with little decrements at high levels. The possibility that increases in specific virtues likewise lead to higher overall happiness is a promising avenue for further work.

## 10 | POSSIBLE LIMITATIONS AND FUTURE DIRECTIONS

Although the current undertaking of six studies has been significant, there are also limitations. For one, the current studies do not disentangle the intensity and frequency of the affective components of SWB, which may provide more nuance to the findings. For example, high levels of self-control frequency may not have noticeable downturns in the intensity of positive feelings immediately, but the frequency with which one experiences positive feelings from self-control actions may lessen over time. This may also have a bearing on whether further assessing intensity or frequency components of affective SWB will reveal inverted-U effects. Future research could address this intriguing question, although it is also necessary to determine how best to parse and measure self-control in terms of intensity and frequency in such an effort.

In our studies, we found that while self-reported self-control ratings consistently predicted SWB, teacher-reported self-control ratings were not as consistent. Although an outsider’s perspective might provide less biased assessments of self-control, it is also possible that such assessments may be deficient in some respects. This is because successfully exercising self-control may not result in behaviors that are transparent to others, and teacher reports are often informed by failures in self-control. For example, a student may need to successfully exercise self-control several times during class in order to pay prolonged attention. The teacher cannot recognize these successful instances of self-control, but is more

likely to take notice when the student fails to pay attention. This limitation can be rectified in future research by utilizing behavioral measures of self-control.

Although our studies focused on SWB, the concept of well-being is multifaceted (Su, Tay, & Diener, 2014). Future research should examine whether the same conclusion holds for other aspects of well-being, such as psychological well-being (Ryff, 1989). In her conceptualization, Ryff proposes six dimensions of psychological well-being (autonomy, self-acceptance, positive relations with others, environmental mastery, purpose in life, and personal growth) that are representative of a fulfilling life. In order to fulfill these needs, individuals will need to exert a significant amount of self-control, potentially to the point where the fulfillment of one need may come at the detriment of another. Furthermore, the self-control tendencies needed to achieve these dimensions may be contradictory with one another. For instance, it may be possible that high levels of self-control tendencies needed to facilitate feelings of mastery or personal accomplishment may sacrifice close social relationships (Letzring et al., 2005). In this case, there may be some trade-offs between self-control and well-being, leading to observable inverted-U effects.

## 11 | CONCLUSION

Self-control lies at the center of current public policy debates (Moffitt et al., 2011). There are wide-scale programs being designed to help improve self-control among the masses, as it has been shown to lead to several beneficial outcomes (De Ridder et al., 2012). Yet, some remain concerned that too much self-control can have detrimental consequences (Grant & Schwartz, 2011). The present investigation did not find evidence suggesting detrimental consequences with respect to SWB. Instead, the more self-control people have, the happier they will be. There may be no such thing as too much self-control—at least for happiness.

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## CONFLICT OF INTERESTS

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