Multiple Levels of Influence on Wellbeing: Individual Factors, Relationships, and Life Events

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Chapter 2:

Self-Control and Individual Wellbeing: Within-Person Deviations and Bidirectional Association

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Abstract

The aim of this research is twofold. First, we examine the associations of between-person differences and within-person deviations in self-control with psychological wellbeing. Second, we investigate the direction of the association between self-control and wellbeing. We tested our hypotheses across two diverse samples using longitudinal surveys, specifically 69 American undergraduate students using biweekly assessments across 27 weeks in Study 1, and 398 Dutch middle-aged individuals using yearly assessments across four years in Study 2. Our results showed that both between-person differences and within-person deviations in self-control were concurrently related to wellbeing. The concurrent association between within-person deviations and wellbeing was significant among both low and high self-control people (in seven out of nine wellbeing indicators). Moreover, longitudinal results showed that the relation of between-person differences in self-control and wellbeing is bidirectional. Self-control and wellbeing were positively related to each other over time. We conclude that to paint a more complete picture of the association between self-control and wellbeing different types of variations in self-control need to be considered.

Self-control helps people to cope with everyday life, work, and relationships. It provides them with the ability to resist temptations and to regulate behaviors according to their goals, or some internal or external standards (Baumeister, Vohs, & Tice, 2007). For example, people with high level of self-control stick to their diets, exercise more often, earn more success in their professional life, and maintain more harmonious social relationships (De Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). Not surprisingly considering these positive outcomes, recent studies demonstrated a positive association between self-control and general psychological wellbeing (Cheung, Gillebaart, Kroese, & De Ridder, 2014; Hofmann, Luhmann, Fisher, Vohs, & Baumeister, 2013). Importantly, the benefits of self-control extend to the temporary (e.g., feelings of happiness) and relatively stable (e.g., life satisfaction) components of wellbeing (Hofmann et al., 2013).

Despite significant advances on the association between average level of self-control and wellbeing, we know little about how fluctuations of self-control are related to wellbeing. One way forward is to increase our knowledge on within-person rather than between-person mechanisms. This insight would provide important information on the malleability of self-control, and possibly identify inroads to learning and intervention. In this research, we aim to extend the recent findings on the relation of self-control to psychological wellbeing in two respects. First, we aim to investigate the association between within-person deviations in self-control and wellbeing. Despite the fact that some people have high and some people have low trait self-control on average, individuals experience fluctuations in their self-control in their daily life (e.g., Hofmann, Vohs, & Baumeister, 2012; Vohs et al., 2008). On some days, they are better able to regulate their behaviors, thoughts, and emotions than on other days. Conversely, on some days they feel depleted and do not have the strength to resist temptations or alter their behaviors. How do these fluctuations affect wellbeing? Do people have higher levels of wellbeing at a time point when their level of self-control is higher than their average? The current research begins answering these questions by examining the association of within-person deviations in self-control with wellbeing while seeking to replicate the findings on between-person differences in self-control.

The second aim of this research is to investigate the direction of the association between self-control and wellbeing. Even though some studies showed the positive effect of self-control on wellbeing (Cheung et al., 2014; Hofmann et al., 2013), other studies found a positive effect of wellbeing on self-control (Aspinwall, 1998;

Fredrickson, 2004; Isen & Reeve, 2005; Tice, Baumeister, Shmueli, & Muraven, 2007). No longitudinal study, to our knowledge, has examined the direction of the association between these two variables. In this research, we aim to fill this gap by examining the direction of the association between self-control and wellbeing in two longitudinal studies.

Malleable Component of Self-Control

Self-control is defined as the capacity to resist impulses and to alter thoughts, emotions, and behaviors to meet some internal or external standards (e.g., Baumeister et al., 2007). People with high self-control levels avoid temptations in their lives and develop good habits to reach their goals (Galla & Duckworth, in press; Hofmann et al., 2013). Self-control has relatively stable and temporary components, which are often referred to as trait and state self-control in the literature (Baumeister & Heatherton, 1996). Although state self-control reflects the current level of self-control and is more susceptible to situational and environmental influence than trait self-control (Hofmann et al., 2012; Vohs et al., 2008), trait self-control is malleable too. For example, long-term changes in situational and environmental factors, motivated trainings, or repeated depletions can lead to changes in trait self-control (Finkenauer et al., 2015; Hennecke, Bleidorn, Denissen, & Wood, 2014; Johnson, Richeson, & Finkel, 2011).

Self-control is malleable, because exerting self-control requires energy and impairs further acts of self-control. Laboratory and field studies have demonstrated that effortful daily activities and brief exertions of self-control decrease self-control strength. To illustrate, not being able to sleep well the day before (Christian, & Ellis, 2011) and feeling socially excluded (Baumeister, DeWall, Ciarocco, & Twenge, 2005) predict a decrease in self-control in other, seemingly unrelated tasks requiring the exertion of self-control. Furthermore, long-term exposure to stressful conditions such as poverty and unpredictable and chaotic family conditions can impair self-control (Deater-Deckard, 2014; Finkenauer et al., 2015; Lengua, Honorado, & Bush, 2007). Conversely, small acts of self-affirmation and encouragements in daily life can lead to increases in self-control and temporarily boost self-control (Baumeister et al., 2005; Hamburg & Pronk, 2015; Schmeichel & Vohs, 2009). Moreover, long-term, repetitive and motivated acts such as exercising can improve self-control (Diamond & Lee, 2011; Hennecke et al., 2014). Thus, self-control can deviate across time, situational demands, and contextual factors. In this research, we focus on the malleable part of self-control in biweekly assessments in our first study and yearly assessments in our second study.

Between-Person Differences and Within-Person Deviations in Self-Control

Self-control levels can vary across people and over time. In this research, the first variation (i.e., variance across people) is called the *between-person differences in self-control* and assesses whether one has a lower or higher self-control than others. The second variation (i.e., variance over time) is called *within-person deviations in self-control* and assesses whether one's self-control at a certain time point is lower or higher than one's own average over time.

Previous research on the association between self-control and wellbeing mainly focused on the effects of between-person differences in self-control on wellbeing, but failed to examine the association between within-person deviations in self-control and wellbeing (Cheung et al., 2014; Hofmann et al., 2013). In this research, we investigate the relation of within-person deviations in self-control to wellbeing. We hypothesize that people report higher levels of wellbeing when their self-control is higher than their average than when their self-control is lower than their average. We also aim to replicate the positive association of between-person differences in self-control with wellbeing. Examination of both between-person differences and within-person deviations in self-control in the same model will provide us with the opportunity to examine the two different components of self-control and their differential associations with wellbeing (Bolger & Laurenceau, 2013; Tennen, Affleck, Armeli, & Carney, 2000).

Direction of the Association between Self-Control and Wellbeing

In this research, we also aim to examine the directionality of the association between self-control and wellbeing. Based on the literature, both directions of influence are plausible as we will explain in the following.

Self-control affects wellbeing. Previous studies identified several mechanisms why self-control positively affects wellbeing. For example, a study by Cheung and colleagues (2014) showed that the relation between self-control and happiness was mediated by regulatory orientation. Self-control's positive association with promotion focus and its negative association with prevention focus partly explain the association between self-control and happiness. Hofmann et al. (2013) showed the positive effect of self-control on both temporary wellbeing and life satisfaction. This effect was partly explained by high self-control people's ability to manage their daily lives to experience fewer conflicts and temptations. Similarly, recent studies showed that self-control's positive effects on several life domains is due to high self-control people's capacity to avoid temptations and sticking to beneficial habits (De Ridder et al., 2012; Galla & Duckworth, in press). Thus, based on this literature, self-control should positively affect wellbeing.

Wellbeing affects self-control. At the same time, research suggests that wellbeing may affect self-control. Tice and Bratslavsky (2000, p.149) stated that "When in a bad mood, people want to feel better, and many ways of feeling better involve indulging appetites—things that one normally uses self-control to resist." For example, when they feel bad, people are more likely to engage in excessive levels of eating (Heatherton, Striepe, & Wittenberg, 1998), smoking (Zinser, Baker, Sherman, & Cannon, 1992), or shopping behaviors (Faber, & Christenson, 1996). Not resisting impulses and giving in to temptations allow distressed people to indulge themselves and get out of their negative states (Tice, Bratslavsky, & Baumeister, 2001). Thus, distress and negative affect may result in decreased self-control, including shorter delay of gratification and lower ability to control impulses.

Furthermore, Fredrickson (2004) proposed that, opposite to the effects of negative feelings (e.g., anxiety), which narrow people's perception and attention, positive feelings broaden people's mindsets. This positive mindset is defined as being approach- and action-oriented, and results in better self-regulation to pursue goals (Aspinwall, 1998; Fredrickson, 2004; Isen & Reeve, 2005; Lyubomirsky, King, & Diener, 2005). Moreover, research showed that wellbeing and positive affect result in increase in dopamine levels, which in turn increases people's ability to control their emotions and behaviors (Ashby, Isen, & Turken, 1999; Subramaniam & Vinogradov, 2013). Thus, based on the literature, wellbeing should positively affect self-control.

Previous studies examined one direction of the association between self-control and wellbeing. Extending these findings, we seek to examine both directions in the same model. Based on the existing evidence, we propose that self-control and wellbeing mutually reinforce each other.

Overview of Our Research

The present research has two aims. First, we investigate the associations of between-person differences and within-person deviations in self-control with wellbeing. We propose that both of them influence wellbeing. Second, we examine the direction of the association between self-control and wellbeing in two longitudinal studies, and, based on the existing literature, hypothesize that the relation between self-control and wellbeing is bidirectional.

Most studies on changes in self-control include laboratory examinations. In this research, we seek to investigate natural, real-life fluctuations and their effects on wellbeing. We tested our predictions in two longitudinal studies,

which complement each other. Study 1 followed undergraduate students at an American university biweekly for 27 weeks. Study 2 followed newlywed couples in the Netherlands every year for four years. These two datasets therefore provided us with the opportunity to replicate our findings across two different samples, different countries, and two different time frames.

Moreover, to examine the robustness of our findings across different indicators of wellbeing, we included relatively more stable (e.g., self-esteem) and variable (e.g., mood) indicators, as well as positive (e.g., happiness) and negative indicators (depressive symptoms) in our research. Although we used a latent wellbeing variable predicted by all these indicators in our main analyses, we also tested our hypotheses across all these indicators separately to investigate the generalizability of our suggestions (cf. Lyubomirsky et al., 2005). We also added time (i.e., study waves) to our analyses to rule out the possibility that the change in wellbeing is simply because time passes (Bolger & Laurenceau, 2013). Last, in order to rule out alternative explanations, we re-ran our analyses controlling for the effects of age, gender, and physical health on psychological wellbeing, although there were contradictory findings about the direction and magnitude of their effects on wellbeing (Diener, Suh, Lucas, & Smith, 1999).

Method

Study 1

Data of Study 1 were collected from university students of an American university. University students filled in 14 biweekly online questionnaires.

Participants and procedure. In total 69 undergraduate students participated in this study. Average age was 18.04 (*SD* = .43). Data were almost equally distributed across gender (51% were males). Most participants were European American (76%) and Asian American (11%). The remaining participants included participants from African American, Hispanic, Native American ethnicities, and other nationalities.

Participants were invited to a longitudinal study about dating processes through flyers hung in the university campus (for details of the procedure, see Study 2 in Finkel, Burnette, & Scissors, 2007). Inclusion criteria were being a first-year undergraduate student, being in a relationship longer than two months, having an age between 17 and 19 years old, and being a native English speaker. Additionally, only one of the partners in a couple was accepted to the study.

Measures. Given the intensive longitudinal method (i.e., repetitive biweekly measurements for each participant) of the study, questionnaire was short, and

tested each study variable using only one item. Here, we only report the variables relevant to this study. All Likert scales included seven points (1 = *completely disagree*, 7 = *completely agree*).

Self-control. Self-control was assessed using the item "I am able to resist temptations and work effectively toward long-term goals."

Wellbeing indicators. Study 1 included five indicators of wellbeing: mood, happiness, vitality, subjective wellbeing, and self-esteem. Mood and happiness were assessed using the items "I am in a positive mood right now" and "In general, I am pretty happy these days", respectively. Items to assess vitality, subjective well-being, and self-esteem were "I feel alive and vital", "I am satisfied with my life", and "I have high self-esteem", respectively.

Control variables. We controlled for the effects of time, age, gender, and physical health in our analyses. Physical health was assessed using one item "In general, would you say your health is...?" (1 = *excellent*, 5 = *poor*) at a time period 24-48 hours after the first biweekly questionnaire. We recoded this item such that higher levels indicated better physical health.

Study 2[1]

To examine the robustness and generalizability of our suggestions, we also tested our expectations in a prospective study among middle-aged newlywed couples in the Netherlands. While Study 1 covered a 27-week time period with bi-weekly measurements, Study 2 used annual measurements over the course of four years (i.e., five study waves). Also, Study 2 used validated scales to assess study variables. Thus, Study 2 complements Study 1 in several respects.

Participants and procedure. In total 398 heterosexual newlyweds who live in the Netherlands participated in this study[2]. Almost all of the participants (98%) were Dutch. Participants' average age was 30.65 (*SD* = 4.79) in the first study wave.

Dutch municipalities provided contact information of newlyweds. We sent written invitations to each couple for a study on wellbeing and marriage. We then contacted the people, who responded favorably to our invitation, by phone to verify their fulfillment of the study's criteria. Specifically, we checked whether it was their first marriage, they had no children, and they were between 25 and 40 years old. In total, 19% of the people to whom invitations were sent participated in our study.

1 Because we report both Study 1's and Study's results together in the same Tables and Figures in the Results section, we do not have two separate Method sections for these studies either.

2 Although participants were couples, because our research question is not about their relationships, we present them as individuals here. Nevertheless, we consider the interdependence between the partners' responses in our multilevel analyses.

The first data collection took place about two months after marriage. Four additional data collections took place at one-year intervals. At each wave, we ensured that the partners filled in the questionnaires separately by having a trained interviewer present during the data collection at couples' homes.

Measures.

Self-control. We assessed self-control using the 11-item version of the Trait Self-control Scale (Tangney, Baumeister, & Boone, 2004; Dutch translation Finkenauer, Engels, & Baumeister, 2005; αs = .72-.78 across five study waves). Sample items are "I am good at resisting temptation" and "I am able to work effectively toward long-term goals."[3] We administered a 5-point Likert scale (1 = *completely disagree*, 5 = *completely agree*).

Wellbeing indicators. In this study we used four indicators of wellbeing: happiness, depressive symptoms, stress, and self-esteem.

Happiness was measured using the 4-item scale of Lyubomirsky and Lepper (1999, αs = .76-.83 across study waves). For example, we asked participants whether they consider themselves as a happy person in general (1 = *not a very happy person,* 7 = *a very happy person).*

Depressive symptoms in the past week were assessed using the Center for Epidemiologic Studies Depression Scale (CESD) developed by Radloff (1977). An example item of the 20-item scale is "During the past week, I thought my life had been a failure." We administered a 4-point Likert scale *(*1 = *rarely or never (less than 1 day),* 2 = *sometimes (1-2 days),* 3 = *regularly (3-4 days),* 4 = *usually or always (5–7 days)).* Cronbach's alpha levels ranged between .84 and .86 across study waves.

We assessed *stress* in the past month by using 11-item Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). An example item is "In the last month, how often have you felt that you were unable to control the important things in your life?" (1 = *never*, 5 = *very often*). Cronbach's alpha levels across study waves were between .85 and .86.

We measured *self-esteem* using the 10-item Self-esteem Scale of Rosenberg (1965, αs = .83-.86 across study waves). An example item is "On the whole, I am satisfied with myself." (1 = *completely disagree*, 5 = *completely agree*).

Control variables. As in Study 1, we controlled for the effects of time, age, and gender in our analyses. Physical health was not assessed in this study.

3 These items also show the similarity of self-control scales across two studies in this paper, because the item to assess self-control in Study 1 was "I am able to resist temptation and work effectively toward long-term goals."

Results – Study 1 and Study 2

Strategy of Analysis

In both studies' analyses, we used both between-person differences in self-control and within-person deviations in self-control as independent variables, which provided us the advantage to investigate each effect controlling for the other (Bolger & Laurenceau, 2013). The preparation of the data for the analyses had three consecutive steps: 1) We first grand-mean centered the self-control scores to have zero as the mean of the variable. 2) We then computed each participant's average self-control level across study waves, which represented the between-person differences in self-control. 3) Finally, we subtracted each participant's between-person difference score from that participant's scores at each study wave. This new score at each study wave thereby indicated within-person deviation, that is, how much that person's score at that wave deviated from his/her own average (for detailed description of this type of data preparation, see Bolger & Laurenceau, 2013, Chapter 5). Hence, the between-person difference was constant across study waves for each participant (Level-2 variable in the multilevel analysis) whereas within-person deviations varied across study waves (Level-1 variable). In our analyses, we examined the associations of both between-person differences and within-person deviations in self-control with wellbeing.

Given that our data in Study 1 and Study 2 were composed of two (time-individuals) and three levels (time-individuals-couples), respectively, we examined our hypotheses conducting multilevel analysis. This analysis provided us the benefits to deal with the interdependency across levels of the data, and examine the between-person differences (Level-2 variable) and within-person deviations (Level-1 variable) at the same time.

In order to differentiate error variance from real variance in wellbeing, we used latent variables in our analyses. Given that there were different indicators of wellbeing in both studies, we were able to estimate latent variables using two parcels, composed of the indicators with equivalent factor loadings in our preliminary factor analyses (Little, Cunningham, Shahar, & Widaman, 2002). In Study 1, one parcel included happiness, vitality, and subjective wellbeing, and the other parcel included mood and self-esteem. In Study 2, one parcel included happiness and self-esteem, and the other parcel included reversed scores of depressive symptoms and stress[4]. We conducted our analyses using Mplus version 7 (Muthén & Muthén, 2012) and maximum likelihood estimation.

4 Given that happiness and CESD had seven- and four-point Likert scales respectively, they were converted to five-point scales before parceling. We also re-ran our analyses without that conversion. The results were identical to the results reported in this paper.

Descriptive Statistics and Correlations

We first examined the descriptive statistics of our study variables, and correlations between them (Table 2.1). The results showed that in both studies, self-control was positively related to between-person differences in self-control. This result was not surprising given our data preparation method; we computed between-person differences by taking the average of each participant's scores across waves. That is, people who reported higher self-control levels than others at a wave had higher levels of between-person differences. Positive associations between within-person deviations and self-control indicated that at waves when people reported scores, which were higher than their own average, they had higher self-control levels than others. Between-person differences and within-person fluctuations were not correlated to each other (r = .00), because between-person difference scores were constant across waves within each person.

The correlations also revealed that both between-person differences and within-person fluctuations in self-control were related to all dependent variables across both studies. For all variables, the relations of dependent variables to between-person differences in self-control were stronger than their relations to within-person deviations in self-control. That is, whether a person had higher self-control than others seems to be more influential on wellbeing than whether that person has higher self-control than his/her own average self-control level. Furthermore, positive correlations between positive dependent variables (e.g., happiness and subjective wellbeing), positive correlations between negative dependent variables (e.g., depressive symptoms and stress), and negative correlations between positive and negative dependent variables (e.g., happiness and stress) are in line with our assumption that these indicators tap into same latent variable, which is psychological wellbeing.

Repeated Cross-Sectional Analyses: Between-Person and Within-Person Self-Control

In our multilevel analyses for both Study 1 and Study 2, we regressed latent wellbeing variables onto between-person differences and within-person deviations in self-control at the same time period. The loadings of the indicators on the latent wellbeing variables are presented in Table 2.2, and the results of our analyses are given in Table 2.3. The results yielded that wellbeing showed a significant change in Study 1, but not in Study 2. That is, wellbeing increased over 27 weeks in Study 1, but remained stable over the first four years of marriage in Study 2.

Table 2.1

Correlations among the Study Variables

Variable	*M* (S1)	*SD* (S1)	*M* (S2)	*SD* (S2)	1	2	3	4	5	6	7	8	9	10
1. Self-control	5.29	1.18	3.26	.46		.90	.43	-	.40	-	-	.52	-.40	-.46
2. Self-control BTW	.00	.83	.00	.42	.71		.00	-	.41	-	-	.51	-.39	-.46
3. Self-control WTH	.00	.83	.00	.20	.71	.00		-	.07	-	-	.14	-.12	-.10
4. Mood	5.44	1.38	-	-	.30	.29	.13			-	-	-	-	-
5. Happiness	5.71	1.09	5.67	.88	.36	.34	.17	.66		-	-	.57	-.48	-.50
6. Vitality	5.55	1.22	-	-	.40	.43	.14	.67	.68		-	-	-	-
7. Subjective wellbeing	5.71	1.02	-	-	.38	.42	.13	.56	.71	.66		-	-	-
8. Self-esteem	5.61	1.07	4.09	.46	.39	.41	.15	.46	.57	.59	.64		-.49	-.51
9. Depressive symptoms	-	-	1.34	.30	-	-	-	-	-	-	-	-		.67
10. Stress	-	-	2.08	.49	-	-	-	-	-	-	-	-	-	

Note. Descriptive statistics and correlations show the statistics across all waves of data. All correlations, other than .00, are significant, *p*s =< .01. S1 = Study 1. S2 = Study 2. BTW = Between-person differences. WTH = Within-person deviations. All Study 1 variables and happiness in Study 2 were assessed using 7-point Likert scales. Depressive symptoms in Study 2 were assessed using a 4-point scale. Other Study 2 variables were measured using 5-point Likert scales. Correlations under the diagonal are correlations for Study 1, correlations above the diagonal are correlations for Study 2.

Table 2.2

Estimated Loadings for Parcels on Latent Variables

Variable	Unstandardized Loading	Standardized Loading	95% CI for Standardized Loading	*p*
Study 1-Within Level				
Parcel 1(happiness, vitality, subjective wellbeing)	1.00	.84	[.77, .91]	< .01
Parcel 2 (mood, self-esteem)	1.16	.84	[.77, .91]	< .01
Study 1-Between Level				
Parcel 1(happiness, vitality, subjective wellbeing)	1.00	.97	[.91, 1.03]	< .01
Parcel 2 (mood, self-esteem)	0.96	.96	[.91, 1.02]	< .01
Study 2-Within Level				
Parcel 1(happiness, self-esteem)	1.00	.75	[.67, .84]	< .01
Parcel 2 (CESD, stress)	0.95	.62	[.55, .70]	< .01
Study 2-Between Level				
Parcel 1(happiness, self-esteem)	1.00	.83	[.77, .88]	< .01
Parcel 2 (CESD, stress)	0.83	.90	[.84, .95]	< .01

Table 2.3

Fixed Effect Estimates for the Between-Person Differences and Within-Person Deviations on Wellbeing

Variable	Unstandardized Estimate	Standardized Estimate	95% CI for Standardized Loading	*p*
Study 1				
Time (Study waves)	.02	.15	[.08, .20]	< .01
Self-control BTW	.53	.63	[.51, .76]	< .01
Self-control WTH	.17	.25	[.19, .30]	< .01
Study 2				
Time (Study waves)	-.00	-.01	[-.07, .03]	.75
Self-control BTW	.55	.74	[.69, .80]	< .01
Self-control WTH	.27	.28	[.22, .31]	< .01

Note. BTW = Between-person differences. WTH = Within-person deviations. Our models had perfect fit, X^2 (1, N =69) = .00 (p = .97), CFI = 1.00, and RMSEA = .00 in Study 1, and X^2 (2, N =398) = .64 (p = .73), CFI = 1.00, and RMSEA = .00 in Study 2.

More importantly for our research question, results in Table 2.3 showed that both between-person differences and within-person deviations were positively related to wellbeing in both studies. In both studies, the strength of the association of wellbeing with between-person differences in self-control was higher than the strength of its association with within-person deviations in self-control. To illustrate, in Study 1, between-person differences in self-control were positively related to wellbeing, $B = .63$, 95% CI = [.51, .76], $p < .01$, indicating that people who have higher levels of self-control reported higher levels of wellbeing than people with lower levels of self-control. Specifically, a difference of one standard deviation in between-person self-control was related to a .63 standard deviation higher level of wellbeing. Within-person deviations in self-control too were positively related to wellbeing, $B = .25$, 95% CI = [.19, .30], $p < .01$. That is, people reported higher levels of wellbeing when their self-control was higher than their average.

Given the stronger effect of between-person differences of self-control compared to within-person deviations in self-control, our model explained 40% of the wellbeing variance at the between-person level (Level-2 variance), but only 8% of the variance at the within-person level (Level-1 variance) in Study 1. Similar results emerged in Study 2. Explained variances at between-person level and within-person level were 55% and 8%, respectively.

In subsequent analyses, in order to rule out alternative explanations, we re-ran Study 1's analyses controlling for the effects of age, gender, and physical health on wellbeing. Results revealed that age[5] and gender had no effects, whereas physical health was positively related to wellbeing, $B = .34$, 95% CI = [.17, .52], $p = .001$. Nevertheless, the effects of the between-person differences and within-person deviations remained significant controlling for the effects of these confounding variables, $B = .58$, 95% CI = [.43, .74], $p < .01$, and $B = .29$, 95% CI = [.23, .36], $p < .01$, respectively. This model explained 63% of the variance at the between-person level and 10% of the variance at the within-person level.

We also re-ran our analyses for Study 2 controlling for the effects of age and gender (physical health was not assessed in Study 2) on wellbeing. Results revealed that both age[6] and gender were related to wellbeing, $B = -.17$, 95% CI = [-.30, -.05],

5 Small variance of age in Study 1 would be the reason of not finding an association between age and wellbeing.

6 Age was a between-person variable in Study 1, because the study took place in the same year across 27 weeks. Nevertheless, age was a within-person variable in Study 2, because the study took place across four years. For Study 2, we conducted another analysis using the age at the first year of the study as a between-person confounding variable, and again found identical results.

p = .03 and B = -.15, 95% CI = [-.23, -.07], p < .01, respectively. Older participants reported lower levels of wellbeing than younger participants, and women reported lower levels of wellbeing than men. Similar to Study 1, in Study 2, the effects of between-person differences and within-person deviations remained significant when controlling for the effects of these confounding variables, B = .72, 95% CI = [.67, .78], p < .01 and B = .27, 95% CI = [.22, .32], p < .01, respectively. This model explained 57% and 10% of the wellbeing variances at the between-person and within-person levels, respectively.

Taken together, these results showed that both between-person differences in self-control and within-person deviations in self-control are positively related to wellbeing. People who had higher levels of self-control reported higher levels of wellbeing than people with lower levels of self-control. Furthermore, people reported higher levels of wellbeing at the time points when their self-control was higher than their average than at the time points when their self-control was lower than their average.

We also conducted the above-described analyses for each wellbeing indicator separately to examine whether our findings hold for all indicators similarly (Table 2.4; cf. Lyubomirsky et al., 2005). Results revealed that main effects of between-person differences and within-person deviations in self-control were significant for all wellbeing indicators. Furthermore, we investigated the interactive effect of between-person differences in self-control with within-person deviations in self-control on wellbeing indicators (Table 2.4). Our results showed that interactive effect of between-person differences with within-person deviations was significant only for two out of nine wellbeing indicators[7]. These results suggest that within-person deviations in self-control were related to seven out of nine wellbeing indicators among both low and high self-control people.

Longitudinal Analyses: Direction of the Association

To examine the direction of the association between self-control and wellbeing in both studies, we conducted cross-lagged panel analyses. We examined two questions to gauge the direction of the association between self-control and wellbeing: 1) Does self-control at an earlier study wave affect wellbeing at the later

7 Simple slope analyses showed that, in Study 2, within-person deviations in self-control were positively related to happiness only among people who have low self-control, b = .52, 95% CI = [.33, .70], p < .01. This association was not significant among high self-control people, b = .10, 95% CI = [-.08, .29], p = .36. Regarding stress in Study 2, within-person deviations in self-control were negatively related to stress among both low self-control and high self-control people. This effect however was stronger among low self-control people, b = -.37, 95% CI = [-.48, -.27], p < .01, than it was among high self-control people, b = -.14, 95% CI = [-.25, -.04], p = .03.

Table 2.4

Fixed Effect Estimates for the Between-person Differences and Within-Person Deviations on Wellbeing Indicators

	Time (Study waves)			Self-control BTW			Self-control WTH			Self-control WTH*Self-control BTW		
Variable	*b*	95% CI	*p*	*b*	95% CI	*p*	*b*	95% CI	*p*	*b*	95% CI	*p*
Study 1												
Mood	.03	[.01, .05]	< .01	.50	[.35, .64]	< .01	.24	[.14, .34]	< .01	.07	[-.07, .19]	.40
Happiness	.02	[.01, .03]	< .01	.44	[.30, .57]	< .01	.21	[.14, .28]	< .01	.02	[-.07, .11]	.72
Vitality	.02	[.01, .04]	< .01	.63	[.47, .79]	< .01	.18	[.09, .26]	< .01	-.01	[-.11, .09]	.91
Subjective wellbeing	.01	[.00, .02]	.07	.50	[.36, .65]	< .01	.16	[.09, .24]	< .01	.03	[-.06, .12]	.57
Self-esteem	.02	[.01, .03]	< .01	.52	[.36, .69]	< .01	.14	[.07, .20]	< .01	-.03	[-.11, .05]	.59
Study 2												
Happiness	-.02	[-.03, -.00]	.06	.83	[.70, .96]	< .01	.31	[.09, .79]	< .01	-.49	[-.80, -.18]	.01
Self-esteem	.02	[.01, .02]	< .01	.56	[.49, .62]	< .01	.29	[.24, .36]	< .01	-.11	[-.24, .03]	.20
Depressive symptoms	.01	[-.00, .01]	.27	-.28	[-.32, -.25]	< .01	-.20	[-25, -.14]	< .01	.13	[-.00, .25]	.11
Stress	.00	[-.01, .01]	.78	-.54	[-.60, -.48]	< .01	-.26	[-34, -.18]	< .01	.27	[.09, .45]	.01

Note. BTW = Between-person differences. WTH = Within-person deviations. For the sake of space, we placed independent variables (time, between-person differences in self-control, within-person deviations in self-control, and interactive effect of between-person differences and within-person deviations) in the columns, and dependent variables (wellbeing indicators) in the rows. Therefore, for example, first cell in the table shows the effect of time on mood, not the other way around.

study wave, and vice versa? For example, do people, who have a higher level of self-control than others at a time point, have a higher level of wellbeing than others at the later time point? 2) Do within-person deviations in self-control at an earlier study wave affect within-person deviations in wellbeing at the later study wave, and vice versa? For example, if people have a self-control level higher than their average at a time point, do they have a wellbeing level higher than their average at the later time point? Given that longitudinal analysis results based on between-person variation are not generalizable to within-person variation (Molenaar & Campbell, 2009; Selig, Preacher, & Little, 2012), examining longitudinal associations considering both variations will provide us with the opportunity to paint the complete picture of the longitudinal association between self-control and wellbeing.

To investigate the cross-lagged effects in our studies, we estimated the effects of both variables (i.e., wellbeing and self-control) at an earlier study wave on the other variable at the later study wave. In addition to these two cross-lagged effects, we also included autoregressive effects (i.e., the stability effects of variables across study waves) in our model. To examine the first of the above-mentioned questions, we used self-control[8] and latent wellbeing variables. For the second question, we used within-person deviations in self-control and latent wellbeing variable, which is estimated by within-person deviations in wellbeing indicators[9]. We used the same parceling strategy as in the analyses reported above. Given the great number of study waves in our data (i.e., 27 waves in Study 1, and five waves in Study 2), we restructured the data to have two waves, which represented an earlier wave and a later wave. For Study 2, for example, the earlier study wave included the first to fourth study waves, and the later wave included the second to fifth study waves. Because earlier and later waves included more than one study wave, we controlled for the effect of time on self-control and wellbeing in our models (see Figure 2.1a and Figure 2.1b).

Examining the longitudinal influences of between-person differences in self-control and wellbeing. Consistent with our expectations, the results of the analyses examining the first question yielded bidirectional effects in both studies (Table 2.5, Figure 2.1a). In Study 1, our model had a perfect fit, X^2 (5, N =69) =

8 Given that the between-person differences in self-control variable we used in our previous analyses is a Level-2 variable which is constant across all study waves (i.e., average level across time), it is not possible to include that variable in the cross-lagged analysis. Therefore, we used scores of participants at each study wave in this analysis.

9 In the analysis of the first question, latent wellbeing variable is estimated by scores of wellbeing indicators. In the analysis of the second question, latent wellbeing variable is estimated by within-person deviations in wellbeing indicators.

2.10 (p = .84), CFI = 1.00, and RMSEA = .00. Self-control at an earlier wave was positively related to wellbeing at the later wave, B = .08, 95% CI = [.03, .13], p = .01, and wellbeing at a wave was positively associated with self-control at the later wave, B = .14, 95% CI = [.09, .19], p < .01. This model explained 34% of the variance in self-control and 44% of the variance in wellbeing at the later wave.

In Study 2, our model also had a good fit, X^2 (5, N = 398) = 14.90 (p = .01), CFI = 1.00, and RMSEA = .03. Again, we found a positive effect of self-control at an earlier wave on wellbeing at the later wave, B = .13, 95% CI = [.07, .18], p < .01, and a positive effect of wellbeing at an earlier wave on self-control at the later wave, B = .16, 95% CI = [.11, .20], p < .01. Our model explained 64% of the variance in self-control and 53% of the variance in wellbeing at the later wave.

Examining the longitudinal influences of within-person deviations in self-control and wellbeing. Our models in Study 1 and Study 2 for the second question too had good fit indices, X^2 (5, N =69) = 3.49 (p = .63), CFI = 1.00, and RMSEA = .00, for Study 1, and X^2 (5, N = 398) = 18.09 (p < .01), CFI = .99, and RMSEA = .04 for Study 2, respectively. Not confirming our expectations, however, neither of the cross-lagged effects was significant, (Table 2.6, Figure 2.1b). Within person deviations in self-control at a study wave did not predict changes in within person deviations in wellbeing at the later study wave, B = -.01, 95% CI = [-.07, .06], p = .85, in Study 1, and B = -.02, 95% CI = [-.08, .04], p = .52 in Study 2.

Similarly, within person deviations in wellbeing at a study wave did not predict changes in within person deviations in self-control at the later study wave, B = .04, 95% CI = [-.02, .11], p = .27, in Study 1, and B = .04, 95% CI = [-.02, .10], p = .25, in Study 2. Due to the insignificant cross-lagged effects, our model explained 4% of the variance in self-control and 8% of the variance in wellbeing at the later wave in Study 1. In Study 2, these percentages were 4% and 7%, respectively.

In sum, our results showed that there is a bidirectional longitudinal association between self-control and wellbeing at the between-person level. That is, people who reported higher levels of self-control than others at an earlier time point reported higher levels of wellbeing than others at the later time point, and vice versa. Between-person differences in self-control and wellbeing were also related to each other within the same time point. Nevertheless, within-person deviations in self-control and within-person deviations in wellbeing had no longitudinal effects on each other. Thus, having self-control higher than one's average was positively related to wellbeing only at the same period, but did not have a longitudinal effect on wellbeing at the later time point, and vice versa.

Table 2.5

Cross-Lagged Analysis Results for Between-Person Differences

Association	Unstd. Estimate (Study 1 / Study 2)	Std. Estimate (Study 1 /Study 2)	95% CI for Std. Estimate (Study 1 / Study 2)	*p* (Study 1 /Study 2)
Cross-lagged Effects				
Self-control$_t$->Wellbeing$_{t+1}$	.07/.11	.08/.13	[.03, .13]/[.07, .18]	.01/<.01
Wellbeing$_t$->Self-control$_{t+1}$	.18/.20	.14/.16	[.09, .19]/[.11, .20]	<.01/<.01
Stability Effects				
Self-control$_t$->Self-control$_{t+1}$	.50/.69	.50/.69	[.46, .54]/[.65, .72]	<.01/<.01
Wellbeing$_t$->Wellbeing$_{t+1}$	.64/.69	.61/.64	[.57, .66]/[.58, .69]	<.01/<.01
Other Associations				
Time->Wellbeing$_t$	.02/.00	.14/.00	[.07, .22]/[-.05, .05]	<.01/.99
Time->Wellbeing$_{t+1}$	.01/-.00	.06/-.01	[-.00, .13]/[-.05, .04]	.11/.79
Time->Self-control$_t$	.02/.01	.09/.03	[.04, .13]/[-.01, .07]	<.01/.20
Time->Self-control$_{t+1}$	.01/.01	.03/.03	[-.01, .07]/[.00, .07]	.24/.10
Residual Associations				
Wellbeing$_t$<->Self-control$_t$	.47/.11	.44/.63	[.40, .49]/[.60, .66]	<.01/<.01
Wellbeing$_{t+1}$<->Self-control$_{t+1}$	.19/.03	.28/.36	[.22, .34]/[.32, .41]	<.01/<.01
Parcel-1$_t$<->Parcel-1$_{t+1}$	.07/.06	.54/.77	[.40, .68]/[.72, .82]	<.01/<.01
Parcel-2$_t$<->Parcel-2$_{t+1}$	.00/.02	.02/.24	[-.12, .15]/[.18, .30]	.85/<.01
Loadings				
Parcel-1$_t$	1.00/1.00	.92/.80	[.89, .95]/[.77, .82]	<.01/<.01
Parcel-2$_t$	1.01/.85	.88/.76	[.85, .91]/[.73, .79]	<.01/<.01
Parcel-1$_{t+1}$	1.00/1.00	.94/.83	[.91, .97]/[.80, .86]	<.01/<.01
Parcel-2$_{t+1}$	.96/.79	.87/.76	[.84, .90]/[.72, .79]	<.01/<.01

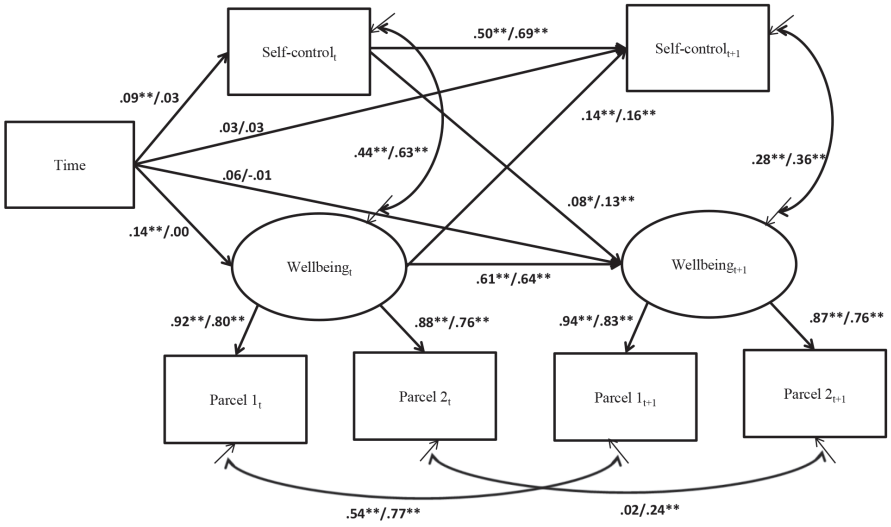
Note. Unstd. = Unstandardized, Std. = Standardized. -> represents unidirectional, and <-> represents bidirectional associations in Figure 2.1a. Results before and after the sign "/"(slash) represent the results in Study 1 and Study 2, respectively.

Table 2.6

Cross-Lagged Analysis Results for Within-Person Deviations

Association	Unstd. Estimate (Study 1 / Study 2)	Std. Estimate (Study 1 /Study 2)	95% CI for Std. Estimate (Study 1 / Study 2)	*p* (Study 1 /Study 2)
Cross-lagged Effects				
Self-control$_t$->Wellbeing$_{t+1}$	-.01/-.02	-.01/-.02	[-.07, .06]/[-.08, .04]	.85/.52
Wellbeing$_t$->Self-control$_{t+1}$	.07/.04	.04/.04	[-.02, .11]/[-.02, .10]	.27/.25
Stability Effects				
Self-control$_t$->Self-control$_{t+1}$	.14/-.20	.14/-.20	[.09, .19]/[-.25, -.15]	<.01/<.01
Wellbeing$_t$->Wellbeing$_{t+1}$	.13/-.20	.12/-.25	[.05, .19]/[-.32, -.18]	<.01/<.01
Other Associations				
Time->Wellbeing$_t$	.02/.00	.24/.02	[.16, .31]/[-.03, .06]	<.01/.60
Time->Wellbeing$_{t+1}$	.02/.01	.22/.05	[.14, .31]/[-.02, .11]	<.01/.26
Time->Self-control$_t$	.02/.01	.13/.07	[.09, .18]/[.03, .11]	<.01/<.01
Time->Self-control$_{t+1}$	.01/.01	.10/.10	[.04, .15]/[.05, .16]	<.01/<.01
Residual Associations				
Wellbeing$_t$<->Self-control$_t$	.11/.01	.25/.30	[.19, .31]/[.25, .35]	<.01/<.01
Wellbeing$_{t+1}$<->Self-control$_{t+1}$	.12/.01	.25/.29	[.19, .31]/[.23, .34]	<.01/<.01
Parcel-1$_t$<->Parcel-1$_{t+1}$	.03/-.00	.23/-.13	[.10, .36]/[-.21, -.04]	<.01/<.01
Parcel-2$_t$<->Parcel-2$_{t+1}$	-.04/-.01	-.23/-.27	[-.36, -.10]/[-.34, -.20]	<.01/<.01
Loadings				
Parcel-1$_t$	1.00/1.00	.83/.81	[.76, .90]/[.73, .89]	<.01/<.01
Parcel-2$_t$	1.17/.82	.85/.58	[.78, .92]/[.52, .65]	<.01/<.01
Parcel-1$_{t+1}$	1.00/1.00	.88/.65	[.81, .95]/[.58, .73]	<.01/<.01
Parcel-2$_{t+1}$	1.03/1.41	.81/.78	[.74, .88]/[.70, .86]	<.01/<.01

Note. Unstd. = Unstandardized, Std. = Standardized. -> represents unidirectional, and <-> represents bidirectional associations in Figure 2.1b. Results before and after the sign "/"(slash) represent the results in Study 1 and Study 2, respectively.



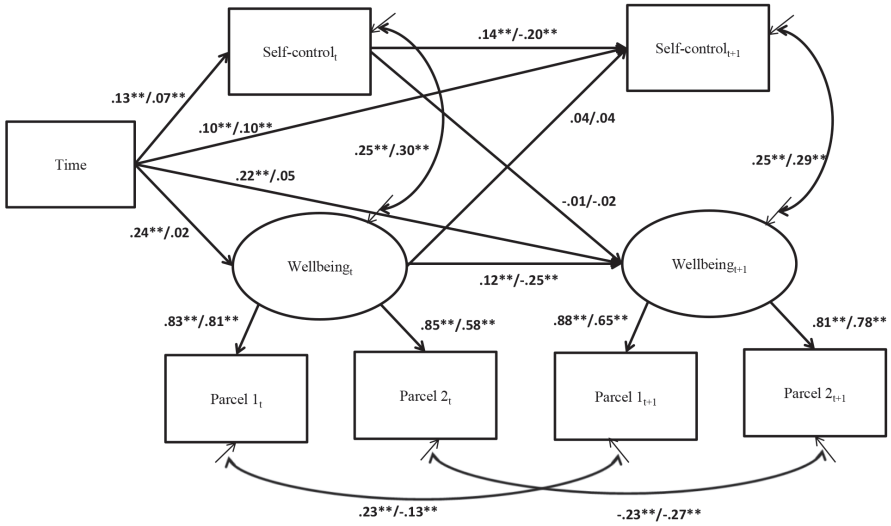


Figure 2.1a (top) and Figure 2.1b (bottom). Standardized estimates in cross-lagged panel analysis for between-person differences (Figure 2.1a) and within-person deviations (Figure 2.1b). See Table 2.5 and Table 2.6 for details. t=Time (Earlier study wave), t+1=Time+1 (Later study wave). $^{**}p =< .01$, $^{*}p < .05$.

General Discussion

The present research provides a novel look at the role of self-control in wellbeing. In line with previous research (Cheung et al, 2014; Hofmann et al., 2013), we found that between-person differences in self-control are associated with wellbeing both concurrently and over time. Extending existing research, we found that within-person deviations in self-control are related to wellbeing. Additionally, we found that between-person differences and within-person deviations in self-control were independently related to wellbeing (for seven out of nine wellbeing indicators), indicating that the wellbeing of both people high and people low in self-control on average may benefit or suffer from temporary fluctuations in self-control. Moreover, we showed that self-control and wellbeing mutually reinforce each other: Between-person differences in self-control were positively related to wellbeing over time, and between-person differences in wellbeing were positively related to self-control over time.

Our results remained largely unchanged when controlling for age, gender, and physical wellbeing. These findings suggest that the effects of self-control are not an artifact of general characteristics of individuals. Rather, self-control seems to be an individual trait that is different from general attributes such as age or gender. Nevertheless, other variables should be considered to confirm the unique contribution of self-control to wellbeing. To illustrate, future research should consider other potential dispositional indicators, such as personality traits (e.g., neuroticism; DeNeve & Cooper, 1998) to provide further evidence for the unique role of self-control in wellbeing.

Theoretical Implications

The present work provides important and novel, but preliminary, evidence for the benefits of self-control in wellbeing. At the same time it opens the door to the investigation of additional benefits of self-control in wellbeing. One interesting avenue for research is the investigation of mechanisms underlying the observed links. To illustrate, as noted earlier, self-control may enable people to instigate and maintain healthy habits and behavior, which in turn may be conducive to wellbeing (De Ridder et al., 2012; Galla & Duckworth, in press). Experiences of successful exertion of self-control may lead to feelings of mastery and goal accomplishment, which may not only stimulate people to set more beneficial goals (Bandura & Locke, 2003), but also contribute to their wellbeing. Also, self-control may help individuals to avoid temptations and down-regulate behavioral dilemmas in everyday life thereby reducing negative affect and increasing wellbeing (Gillebaart

& De Ridder, 2015; Hofmann et al., 2013). Finally, it is possible that self-control helps people to maintain good relationships, which in turn have protective effects for mental and physical wellbeing (Holt-Lunstad, Smith, & Layton, 2010). Research pitting different cognitive, behavioral, emotional, and social mechanisms against each other would be particularly promising.

Conversely, more research is needed to examine the mechanisms underlying the link between wellbeing and self-control. This research may profit from distinguishing controlled and automatic pathways. To illustrate, research on self-licensing suggests that when people have engaged in effort or prior restraint, they feel justified to indulge in short-term pleasures and hedonic choices (e.g., de Witt Huberts, Evers, & de Ridder, 2012). It is possible that such self-licensing effects extend to low wellbeing, in that people who feel bad about themselves or their lives may feel and reason that they deserve lapses in self-control and seek immediate relief and pleasure to make them feel better. At the same time, it is possible that wellbeing undermines self-control more automatically, for example, when people are exposed to contextual stressors (Finkenauer et al., 2015), experience sleep deprivation or disturbance (Christian & Ellis, 2011), or have learned that low self-control may be effective in making them feel better in the short run (Tice et al., 2001).

Limitations and Strengths

Before closing, it is important to note several strengths and limitations of the present work. Although our studies were longitudinal, a first limitation of the present research centers on the fact that we employed correlational data. Consequently, we cannot draw strong causal conclusions. In our longitudinal analyses, as hypothesized, we found that the relation between between-person differences in self-control and wellbeing was bidirectional, indicating that these variables mutually reinforce each other. Nevertheless, the link of prior wellbeing on later self-control was slightly stronger than the link in the opposite direction. Experimental research should examine the causal links between self-control and wellbeing.

The influence of between-person differences in self-control on wellbeing held longitudinally. Within-person deviations in self-control showed no longitudinal effects, however. It is possible that the time intervals between data collections in our studies were too long to detect influences of short-term variations of self-control on wellbeing. In line with this suggestion, research suggests that state self-control can be increased by short-term interventions such as rest and

remembering cherished values (Baumeister et al., 2007; Schmeichel & Vohs, 2009). Diary studies would be particularly helpful in examining the short-term dynamics of within-person deviations in self-control and wellbeing.

At the same time, our results are noteworthy in that they rest on data obtained from two diverse samples, students and married individuals, living in the United States and the Netherlands who were tracked cross-sectionally and longitudinally across several weeks (Study 1) and years (Study 2). To our knowledge, the present research is the first to investigate different types of variations of self-control and their link with wellbeing. Our sample of participants was considerable, and we observed remarkably consistent patterns of results across both studies in tests of our key hypotheses. These consistencies thereby promote confidence in our findings regarding the link between self-control and wellbeing.

Concluding Remarks

The present work offers an important contribution to recent research on the role of self-control in wellbeing. We have demonstrated that between-person differences are an important part of wellbeing, in that they function to maintain and even boost wellbeing over time. Furthermore, people also seem to benefit from a temporary shift in their self-control. Within-person deviations in self-control are associated with wellbeing. What is more, our research showed that association between self-control and wellbeing is cyclical: People who have higher levels of self-control than others experience higher levels of wellbeing than others over time, and people who have higher levels of wellbeing than others show higher levels of self-control than others over time.