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Finding meaning in self-control: The effect of self-control on the perception of meaning in life

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ABSTRACT

The present research explored whether self-control is associated with the perception of meaning in life. A week-long daily diary study (Study 1) showed trait self-control (but not daily experiences of self-control failure) to be positively associated with a general sense of meaning in life and daily experiences of meaning. This association was robust against controlling for life satisfaction, positive and negative affect. Study 2 tested two potential mechanisms underlying the association between trait self-control and meaning in life: Successful goal progress and experience of structure in life. While self-control was positively associated with both, only the experience of structure predicted meaning: Self-control was positively related to the perception of one's life as having a clear sense of structure and order, which in turn predicted a stronger perception of meaning. Study 3 replicated the mediation path via the experience of structure and showed it to be stronger for individuals high (vs. low) in the personal need for structure. The present findings add to the emerging literature on trait (and state) self-control and dispositional determinants of meaning in life.

The benefits of self-control have been consistently demonstrated across different life domains, from academic achievement to health (De Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012; Tangney, Baumeister, & Boone, 2004). Individuals scoring higher (vs. lower) on trait self-control are less likely to engage in unhealthy behaviors, procrastination, substance abuse, and delinquent behaviors, and more likely to have successful careers, be trusted by others and enjoy stable romantic relationships (Moffitt et al., 2011; Pronk & Righetti, 2015; Righetti & Finkenauer, 2011; Tangney et al., 2004). Not surprisingly, several recent studies demonstrated high self-control to be positively associated with higher life satisfaction, more positive and less negative affect (Cheung, Gillebaart, Kroese, & De Ridder, 2014; Grund, Grunschel, Bruhn, & Fries, 2015; Hofmann, Luhmann, Fisher, Vohs, & Baumeister, 2014; Wiese et al., 2017).

However, people not only strive for a happy life but also for a life that has meaning (Steger, Oishi, & Kesebir, 2011). Does self-control just make one feel happy and satisfied or does it also help one find meaning in life? Even though life satisfaction and meaning in life are positively associated with each other (Steger & Kashdan, 2007), factors that

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contribute to life satisfaction are sometimes unrelated to (or even undermine) the perception of meaning, and factors associated with a stronger sense of meaning do not always predict higher life satisfaction and happiness (Baumeister, Vohs, Aaker, & Garbinsky, 2013; Oishi & Diener, 2014). As meaning in life has been linked to important life outcomes, from marriage likelihood to mortality risks (Hill & Turiano, 2014; Stavrova & Luhmann, 2016), an inquiry into antecedents of a sense of meaning in life represents an important research endeavor. In the present research, we explored whether the beneficial attributes of self-control extend to the perception of meaning in life. In two studies, we examined the association between self-control and meaning in life and its potential mechanisms: Successful goal progress and the experience of structure in life.

Self-control represents the capacity to override tempting desires for the sake of long-term goals (De Ridder, Kroese, & Gillebaart, 2017). Most existing definitions of self-control emphasize the ability to engage in goal-directed behaviors (Hagger, 2013) and successful goal progress is often mentioned among the most important benefits of high self-control (Tangney et al., 2004). In addition, high levels of self-control are associated with less impulsivity (Friese & Hofmann, 2009), and a stronger reliance on established daily routines and beneficial habits (De Ridder & Gillebaart, 2017). Hence, strong self-control is likely to promote goal progress and has the potential to bring more order, structure, and coherence into an individual's life.

Both goal progress and a sense of structure are central to the perception of meaning in life. Meaning in life is defined as the extent to which one's life is experienced as having significance and being directed by valued goals (Heintzelman & King, 2014; King, Hicks, Krull, & Del Gaiso, 2006; Martela & Steger, 2016). Consistent with this definition, goals have been historically regarded as helping one understand the purpose of one's life (Battista & Almond, 1973). Theoretical and conceptual work has emphasized goals as a source of perceived meaning (Emmons, 2003, 2005). For example, in the four needs for meaning framework, Baumeister (1991) proposed that individuals' actions take meaning as long as they support goal attainment.

Another important aspect of meaning is a sense of coherence, that is, a perception of comprehensibility, connections, structure, and order (Heintzelman & King, 2014; Martela & Steger, 2016). Life is perceived as meaningful when it is structured and predictable and, therefore, "makes sense to the person who lives it" (Heintzelman, Trent, & King, 2013, p. 2). Several theoretical perspectives acknowledge the importance of structure and order as sources of meaning. For example, according to the Terror Management Theory, perceptions of the world as a structured and orderly place represent a source of meaning and counteract mortality concerns (Vess, Routledge, Landau, & Arndt, 2009). Similarly, in the Meaning Maintenance Model (Heine, Proulx, & Vohs, 2006), structured conceptions of reality are seen as an important factor supporting meaning maintenance. Indeed, a number of empirical studies have shown that encounters with structure and coherence in everyday life (e.g., exposure to coherent vs. chaotic linguistic triads) lead to a stronger perception of one's life as meaningful (Heintzelman et al., 2013).

Taken together, as self-control is associated with a successful goal progress and involves the ability to organize and structure one's life, potentially imbuing it with coherence, comprehensibility, and order, we propose that the benefits of self-control might extend beyond general life success and happiness, additionally facilitating the perception of one's life as being meaningful.

We conducted three studies. In Study 1, we tested the associations between trait self-control and experiences of overall and daily meaning in life over a week-long period using daily diary data. In addition, the daily diary design gave us the possibility to explore whether daily experiences of self-control failure are associated with less daily meaning in life. Study 2 examined two potential mediators of the association between self-control and meaning in life: Goal progress and experience of structure in life. To make sure that the effects we report here are not due to a confounding with subjective well-being, we included life-satisfaction, positive and negative affect as control variables in both studies. Finally, Study 3 provided an additional, pre-registered replication of the association between trait self-control and meaning in life as well as of the role of a sense of structure as a mediator. Additionally, it explored potential boundary conditions of this effect by focusing on individual differences in the personal need for structure. The study materials and data can be accessed at the project's open science framework page (https://osf.io/vw768/?view_only=0f80f9d8ebcc4c53b755e50051cd7a7f).

Study 1

Study 1 pursued several goals. First, it examined the associations between trait self-control and a general sense of meaning in life. Second, using a week-long daily diary design, we explored whether trait self-control is related to higher levels of daily meaning. Third, we explored whether daily experiences of self-control failure are negatively associated with daily experiences of meaning in life.

Participants

Five hundred and thirty-six American adults competed the study on Amazon Mechanical Turk (MTurk). Thirty did not pass an attention check (i.e., an item that required them to select a certain response option) and were removed. Overall, 460 participants completed at least one daily assessment and constituted our final sample (52.6% male, M_{age} = 36.45, SD_{age} = 11.60). On average, participants completed 5.56 (SD = 1.88) out of 7 daily assessments. A power analysis conducted with G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009) showed that the sample size of 460 gives us 80% power (α = .05, two-tailed) to detect even small effect sizes (at least r = .12) at the level of individuals (e.g., correlation between trait self-control and a general sense of meaning). We also checked whether the sample is sufficient to detect associations between trait self-control and daily meaning, and between daily self-control failure and daily meaning in a multilevel analysis. Monte-Carlo simulations (1,000 iterations) using the package SIMR for R (Green & MacLeod, 2016) showed that the sample of 460 individuals and an average of 5.56 daily assessments give us 99% power (α = .05, two-tailed) to detect even small effects (r = .10).

Procedure

As part of an intake survey, participants completed a number of personality measures. *Trait self-control* was measured with the Brief Self-control Scale (Tangney et al., 2004) (13 items; sample item: "People would say that I have iron self-discipline"; 5-point scale ranging from "not at all" to "very much"; Cronbach's α = .89). Overall meaning in life was

measured with the presence of meaning subscale of the meaning in life questionnaire (Steger, Frazier, Oishi, & Kaler, 2006). The meaning in life questionnaire includes two subscales: *Presence of meaning* and *search for meaning* subscales that comprise five items each (presence, sample item "My life has a satisfying sense of purpose", Cronbach's α = .96; search, sample item "I'm seeking a purpose or mission for my life": Cronbach's α = .95). A 7-point scale ranging from "absolutely untrue" to "absolutely true" was used. *Life satisfaction* was measured with a single-item measure: "Taking all things together, how satisfied are you with your life as a whole?" (10-point scale, ranging from "extremely dissatisfied" to "extremely satisfied") (Cheung & Lucas, 2014). Participants also provided their basic sociodemographic information, such as age and gender (1 = male, 0 = female).

Every day within the seven days following the intake survey, participants were sent an online link that invited them to fill in a daily assessment. The link was sent at 4 p.m. Eastern Standard Time. The link was active for 24 h. On average, daily surveys were completed within 3.62 (*SD* = 4.76) hours after the invitation letter was sent.

As part of these daily assessments, participants indicated whether on that particular day "they felt that their life was meaningful" (*daily meaning*), whether they "gave in to a temptation" (*daily self-control failure*), "how happy" and "how sad" (reverse-coded) they felt on that particular day (the latter two measures were highly correlated with each other (r = .54, p < .001) and were therefore collapsed into a measure of *daily happiness*). Responses were given on a 7-point scale (1 = not at all, 7 = a lot).

Results and discussion

Means, standard deviations and zero-order correlations are shown in Table 1.

Trait self-control was positively associated with the presence subscale of the meaning in life questionnaire (r = .38, p < .001, 95% CI [.30; .46]). Consistent with existing research (Steger et al., 2006), presence of meaning was negatively associated with search for meaning (r = −.27, p < .001, 95% CI [−.35; −.18]). Trait self-control was also negatively associated with the search for meaning subscale (r = −.23, p < .001, 95% CI [−.31; −.14])[1]. Replicating prior research (e.g., Hofmann, Kotabe, & Luhmann, 2013; Wiese et al., 2017), trait self-control was positively related to life satisfaction (r = .36, p < .001, 95% CI [.28; .44]). Importantly, the association between trait self-control and presence of meaning was robust against controlling for life satisfaction and search for meaning ($r_{partial}$ = .19, p < .001, 95% CI [.10; .28]).

Table 1. Means, standard deviations and correlations among the variables, Study 1.

		M	SD	1	2	3	4	5	6
1	Trait self-control	3.41	0.77	-	-	-	-	-	-
2	Meaning in life (presence)	4.47	0.98	.382***	-	-	-	-	-
3	Meaning in life (search)	4.35	1.67	−.232***	−.266***	-	-	-	-
4	Life satisfaction	6.79	2.45	.363***	.656***	−.233***	-	-	-
5	Daily meaning	4.56	1.70	.406***	.636***	−.208***	.670***	-	-
6	Daily happiness	5.23	1.29	.362***	.455***	−.269***	.640***	.713***	-
7	Daily self-control failure	2.62	1.50	−.386***	−.019	.027	−.117*	−.067	−.20***

*p < .05, ** p < .01, ***p < .001. Correlations with daily measures are average correlations across daily surveys.

Daily meaning

First, we calculated how much variation in daily meaning occurs between- vs. within-individuals, using an intra-class-correlation coefficient (ICC). The ICC reached .61, suggesting that 61% of the variance in daily meaning can be explained by differences between individuals (stable trait-like component) and 39% can be explained by temporal fluctuations within individuals. As shown in Table 1, trait self-control was positively associated with the perception of daily meaning, averaged across seven days ($r = .41$, $p < .001$, 95% CI [.33; .48]). To deal with the problem of not independent observations (daily assessments nested within participants), we examined whether trait self-control predicted daily experiences of meaning using a multilevel regression analysis, with participants' trait self-control being a level 2 variable and participants' daily reports of meaning – level 1 variable. We used full maximum likelihood estimation to deal with missing values. In the first step, we regressed daily meaning on trait self-control. Trait self-control was significantly associated with daily experiences of meaning in life ($b = 0.90$, $p < .001$, 95% CI [0.71; 1.08]), suggesting that individuals scoring higher (vs. lower) on trait self-control were likely to experience their life as meaningful on a daily basis. To make sure that this association was not due to a confounding with daily happiness, in the second step, we added daily happiness (centered within participants) as a predictor. This model included a random intercept and a random slope[2] of daily happiness. Daily happiness was positively related to daily meaning ($b = 0.37$, $p < .001$, 95% CI [0.29; 0.44]); however, the effect of self-control remained significant ($b = 0.90$, $p < .001$, 95% CI [0.71; 1.08]). Finally, we added baseline measures of presence of meaning, search for meaning and life satisfaction as predictors. Baseline measures of presence (but not search: $b = 0.0004$, $p = .99$) of meaning in life and life satisfaction were also positively associated with daily meaning ($b = 0.54$, $p < .001$, 95% CI [0.40; 0.67], and $b = 0.29$, $p < .001$, 95% CI [0.23; 0.34], respectively). Importantly, the association between trait self-control and meaning remained significant ($b = 0.30$, $p < .001$, 95% CI [0.15; 0.45]), suggesting that trait self-control predicts daily meaning regardless of individuals' general sense of meaning in life.

Daily self-control failures

The ICC for daily self-control failure reached .52. That is, 52% of the variance can be explained by differences between individuals and 48% is accounted for by differences within individuals (daily variations). As shown in Table 1, trait self-control was negatively associated with daily experiences of self-control failure ($r = -.39$, $p < .001$, 95% CI [−.46; −.31]). That is, individuals with a higher (vs. lower) level of dispositional self-control were less likely to yield to daily temptations. This pattern was confirmed in a multilevel regression analysis with daily self-control failure as dependent variable and trait self-control as an independent variable ($b = -0.74$, $p < .001$, 95% CI [−0.90; −0.58]).

The above-reported analyses showed trait self-control to be associated with both dispositional and daily measures of meaning in life. Next, we explored whether a similar pattern of results will emerge with respect to daily self-control failures. First, to examine whether an individual's daily fluctuations in meaning are associated with the individual's daily self-control failures, we regressed daily experience of meaning on daily self-control failure (centered within participants) using a multilevel regression with a random intercept and a random slope of daily self-control failure[3]. The results showed that daily self-control failures were unrelated to daily experiences of meaning $b = 0.02$ ($p = .40$).

Second, to examine whether dispositional meaning in life is associated with daily self-control failures, we again recurred to multilevel modeling and regressed daily self-control failure on dispositional meaning in life (the intercept was modeled as random). The effect of dispositional meaning did not reach significance ($b = -0.003$, $p = .97$). In brief, while trait self-control was positively related to overall and daily meaning, daily self-control failures were associated with neither.

Overall, these results suggest that individuals with higher (vs. lower) levels of trait self-control tend to find their lives more meaningful. These associations emerged when using measures of general meaning as well as daily experiences of meaning within one week and were robust against controlling for individual differences in the search for meaning, life satisfaction, and daily happiness. At the same time, while trait self-control was consistently related to higher meaning, daily experiences of self-control failure were associated with neither overall nor daily meaning in life.

Study 2

In Study 2, we sought to replicate the associations between trait self-control and meaning in life demonstrated in Study 1. Additionally, we explored the two proposed mechanisms: Goal progress and experience of structure in life. Specifically, we tested whether people with higher (versus lower) levels of self-control experience more meaning in life, because they have more success reaching their goals, and/or because they experience their life as having more order and structure.

Method

Participants

We recruited 350 American adults on MTurk. Thirty-four failed an attention check question that required them to leave the respective question unanswered. The final sample consisted of 316 individuals (54% male, $M_{age} = 38.01$, $SD_{age} = 11.15$). To check whether this sample size was large enough for a parallel mediation analysis (which is the focus of this study), we used an application for Monte Carlo power analysis for mediation models created by Schoemann, Boulton, and Short (2017). We used 1,000 replications, 80% power, and 95% confidence level. As population input parameters, we entered $r = .38$ ($SD = 0.77$) for the association between self-control and meaning (based on Study 1) and $r = .30$ ($SD = 1.00$) for other parameters in the correlation matrix (we assumed average-sized correlations among both mediators, self-control, and meaning). The results showed that starting from n = 280, both indirect effects can be detected with 80% power. Hence, our sample size was sufficient.

Measurement

Trait self-control
Participants completed the Brief Self-control Scale (Tangney et al., 2004) (13 items; 5-point scale ranging from "not at all" to "very much"; Cronbach's α = .91).

Meaning in life

To measure meaning in life, we used the presence of meaning subscale of the presence and search for meaning questionnaire (Steger et al., 2006) (presence: Cronbach's α = .96; search: Cronbach's α = .95). A 7-point scale ranging from "absolutely untrue" to "absolutely true" was used.

Goal progress

Participants were asked to name three personal goals that they have been pursuing in the recent past. Following Brunstein (1993), personal goals were defined as "objectives, plans, and projects that you have pursued lately and that you intend to work on in the near future". After naming each goal, participants indicated how much progress they had made towards each goal in the recent past (six items, sample items "I have had quite a lot of success in pursuing this goal" and "Many of my efforts in carrying out this goal have failed", Cronbach's α between .91 (goal 1) and .94 (goal 3)). Responses were given on a 7-point scale (1 = strongly disagree, 7 = strongly agree). A stronger progress towards one goal was positively associated with progress towards other goals (between-goals r = .31 and .32); therefore, we averaged participants' responses across the three goals into an index of goal progress. Note that considering the measures of progress towards each goal separately (as three distinct variables) yielded the same results.

Experience of structure in life

To measure participants' sense of their life being coherent and orderly, we used the life comprehensibility scale (Baldwin, Landau, & Swanson, 2017). Using a 7-point scale (1 = strongly disagree, 7 = strongly agree), participants rated their agreement with 7 items, such as "I feel like my life has order", "My life is organized" and "Events in my life feel random" (reverse coded) (Cronbach's α = .89).

Control variables

Additional control variables included a single-item *satisfaction with life* scale ("Taking all things together, how satisfied are you with your life as a whole", 1 = extremely dis-satisfied, 10 = extremely satisfied) (Cheung & Lucas, 2014) and a Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). Participants were given a list of 10 positive and 10 negative emotions and indicted to what extent they generally felt this way (1 = very slightly or not at all, 5 = extremely). Responses to *positive and negative emotions* were averaged (for both, Cronbach's α = .92).

At the end of the questionnaire, participants indicated their age, gender (1 = male, 0 = female) and the highest level of education ("did not complete high school", "completed high school", "college degree").

Results

Descriptive statistics and zero-order correlations among the variables are shown in Table 2. Self-control showed a strong association with meaning in life (r = .48, p < .001, 95% CI [.39; .56]), as well as with life satisfaction (r = .47, p < .001, 95% CI [.38; .55]) and positive (r = .44, p < .001, 95% CI [.35; .52]) and negative (r = −.53, p < .001, 95% CI [−.60; −.45]) affect. To make sure that the association between self-control and meaning in life is not

Table 2. Descriptive statistics and zero-order correlations, Study 2.

	M	SD	1	2	3	4	5	6	7
1 Self-control	3.48	0.82	-	-	-	-	-	-	-
2 Goal progress	3.93	1.15	.513***	-	-	-	-	-	-
3 Experience of structure in life	4.76	1.20	.548***	.448***	-	-	-	-	-
4 Meaning in life (presence)	4.68	1.71	.483***	.324***	.688***	-	-	-	-
5 Meaning in life (search)	4.19	1.71	−.179**	.025	−.092	−.254***	-	-	-
6 Negative emotions	1.49	0.65	−.532***	−.339***	−.425***	−.372***	.172**	-	-
7 Positive emotions	3.10	0.90	.436***	.400***	.553***	.543***	−.030	−.333***	-
8 Life satisfaction	6.53	2.35	.468***	.464***	.640***	.708***	−.123*	−.411***	.598***

$p < .05$, ** $p < .01$, *** $p < .001$

due to a confounding with life satisfaction and affect, we computed a partial correlation between self-control and meaning in life. The partial correlation reached $r_{partial} = .18$, $p = .001$, 95% CI [.07; .28].

Self-control was also positively related to both proposed mediators: Goal progress ($r = .51$, $p < .001$, 95% CI [.42; .59]) and experience of structure ($r = .55$, $p < .001$, 95% CI [.47; .62]. Both goal progress and experience of structure were positively related to meaning in life ($r = .32$, $p < .001$, 95% CI [.22; .42] and $r = .69$, $p < .001$, 95% CI [.63; .74], respectively).
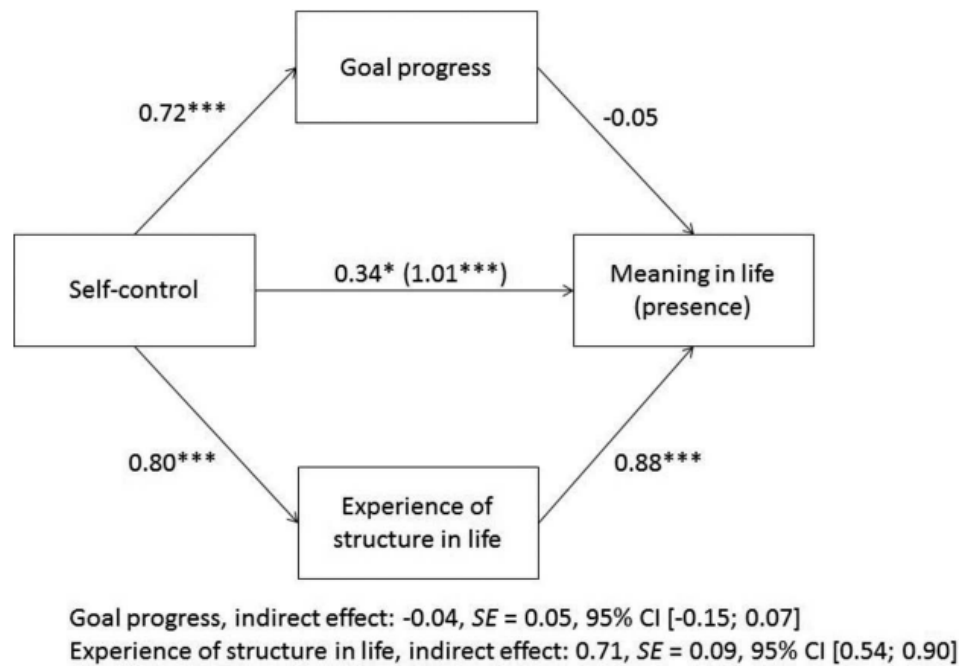
To test whether goal progress and experience of structure in life mediated the association between self-control and meaning in life, we conducted a mediation analysis with goal progress and experience of structure as parallel mediators, using the indirect macro (Preacher & Hayes, 2008). The significance of the indirect effect was determined using a bootstrapping method, with 5,000 resamples. As shown in Table 3, adding the mediators to the regression model reduced the association of self-control with meaning from $b = 1.01$ ($p < .001$, 95% CI [0.81; 1.22], Model 1a) to $b = 0.34$ ($p = .002$, 95% CI [0.13; 0.56], Model 2a). As presented in Figure 1, higher scores on self-control were associated with both a stronger perception of goal progress ($b = 0.72$, $p < .001$, 95% CI [0.59; 0.86]) and experience of structure in life ($b = 0.81$, $p < .001$, 95% CI [0.67; 0.94]). However, only the latter was in turn significantly related to meaning in life ($b = .88$, $p < .001$, 95% CI [0.74; 1.02]). The analyses of the indirect effect showed that only experience of structure

Table 3. Multiple regression analysis on the presence of meaning in life, Study 2.

	Without controls				With controls			
	Model 1a		Model 2a		Model 1b		Model 2b	
Predictor	B	β	B	β	B	β	B	β
Independent variable								
Self-control	1.01	.48***	0.34	.16**	0.29	.14**	0.17	.08
Mediators								
Goal progress	-	-	−0.05	−.04	-	-	−0.15	−.10*
Experience of structure in life	-	-	0.88	.61***	-	-	0.52	.36***
Control variables								
Meaning in life (search)	-	-	-	-	−.16	−.16***	−0.15	−.15***
Negative emotions	-	-	-	-	−.01	−.002	0.06	.02
Positive emotions	-	-	-	-	.31	.16**	0.20	.10*
Life satisfaction	-	-	-	-	.38	.53***	0.30	.41***
Multiple R		.48***		.70***		.75***		.80***
ΔR^2				.26***				.07***
Adjusted R^2		.23***		.49***		.56***		.63***

*$p < .05$, ** $p < .01$, *** $p < .001$

Goal progress, indirect effect: -0.04, $SE = 0.05$, 95% CI [-0.15; 0.07]
Experience of structure in life, indirect effect: 0.71, $SE = 0.09$, 95% CI [0.54; 0.90]

Figure 1. Mediation analysis, Study 2.

in life was a significant mediator (indirect effect: 0.71, 95% CI [0.54; 0.90]; the indirect effect of goal progress was insignificant: −0.04, 95% CI [−0.15; 0.07]). The indirect effect via experience of structure in life remained significant, when adding life satisfaction, positive and negative affect and search for meaning as covariates (0.19, 95% CI [0.10; 0.32]; see Models 1b and 2b)[4].

In brief, Study 2 replicated the result of Study 1 by demonstrating a positive association between self-control and a sense of meaning in life. Again, this association was robust against controlling for life satisfaction, positive and negative affect and individual differences in the search for meaning. A mediation analysis showed that the association between trait self-control and meaning in life was mediated by a stronger perception of one's life having structure and order, rather than by a successful goal progress.

Study 3

Study 2 suggested that trait self-control is related to a sense of order and structure in one's life and therefore, to the perception of one's life as having meaning. The goal of Study 3 was to replicate the association between trait self-control and meaning in life as well as the mediating role of the experience of structure. Hypotheses, measures, data collection, and analyses were preregistered for this study (http://aspredicted.org/blind.php?x=mh5fh3) on the 31 August 2018 (the data were collected on the 1 September 2018). We expected a positive association between trait self-control and meaning in life (H1) and we predicted this association to be mediated by the experience of structure in life (H2). In an exploratory part of the study, we examined whether both the total and the indirect effects are moderated by personal need for structure (PNS). PNS describes individual differences in preferences for structure, simplicity, certainty, and unambiguity (Neuberg & Newsom, 1993). High-PNS individuals seek a structured and a coherent view of the world and are less likely to find

meaning in an ambiguous reality, for example, as presented in abstract art (Landau, Greenberg, Solomon, Pyszczynski, & Martens, 2006). Hence, high-PNS people might be more likely to find meaning in an ordered and structured life that self-control helps to achieve. Therefore, we additionally explored whether both, the total effect of trait self-control on meaning in life and the indirect effect via the experience of structure, are moderated by PNS.

Method

Participants

We decided to recruit as many participants as needed to detect even a small interaction effect between PNS and self-control. A power analysis conducted with G*Power 3.1 (Faul et al., 2009) (80% power, two-tailed test, alpha .05) showed that a minimum of 395 participants is needed to detect a small interaction effect ($f^2 = .10$). This sample size is also large enough for successful tests of H1 and H2. To account for participants' failing the attention check question, we recruited 450 American adults on MTurk. Thirteen failed the attention check question (the same as in Study 1) and were removed, resulting in a final sample of 437 participants (55.6% male, $M_{age} = 37.38$, $SD_{age} = 11.93$).

Measurement

Trait self-control
Participants filled in the Brief Self-control Scale (Tangney et al., 2004) (13 items; Cronbach's α = .90; 5-point scale ranging from "not at all" to "very much").

Meaning in life
Participants filled in the presence of meaning subscale of the presence and search for meaning questionnaire (Steger et al., 2006) (five items; Cronbach's α = .94; 7-point scale ranging from "absolutely untrue" to "absolutely true").

Experience of structure in life
We used the same scale as in Study 2 (Baldwin et al., 2017) (seven items; Cronbach's α = .82; 7-point scale ranging from "strongly disagree" to "strongly agree").

Personal need for structure
Individual differences in the dispositional need for structure were measured with the Personal Need for Structure scale (Neuberg & Newsom, 1993). Participants indicated their agreement (5-point scale ranging from "strongly disagree" to "strongly agree") with 12 items (Cronbach's α = .88; e.g., "I enjoy having a clear and structured mode of life" or "I find that a consistent routine enables me to enjoy life more").

Participants completed these four scales in a randomized order and responded to basic sociodemographic questions at the end.

Results and discussion

Confirmatory analyses

Trait self-control showed a positive association with meaning in life ($r = .53$, $p < .001$, 95% CI [.46; .60], Table 4), providing support to H1. Self-control was also positively associated with the experience of structure ($r = .53$, $p < .001$, 95% CI [.46; .60]) and the experience of structure was positively related to meaning ($r = .65$, $p < .001$, 95% CI [.59; .70]).

A mediation analysis using a bootstrap method for testing the significance of the indirect effect showed that the experience of structure mediated the association between trait self-control and meaning (Figure 2). The indirect effect reached 0.49, 95% CI [.37; .63], replicating the results of Study 2 and providing support to H2.

Exploratory analyses

PNS was associated with neither trait self-control ($r = .09$, $p = .072$, 95% CI [−.01; .18]) nor meaning in life ($r = −.05$, $p = .296$, 95% CI [−.14; .04]). It was positively, although slightly, associated with the experience of structure in life ($r = .11$, $p = .025$, 95% CI [.01; .20]), suggesting that individuals with a stronger need for structure were more likely to experience structure and order in their life.

To examine whether PNS moderates the association between trait self-control and meaning in life, we regressed meaning on mean-centered self-control, mean-centered PNS and their interaction term. The overall model explained 29% of variance in meaning, $F(3, 433) = 60.64$, $p < .001$. However, the interaction term did not reach significance ($\beta = .06$, $p = .17$).

Table 4. Descriptive statistics and zero-order correlations, Study 3.

		M	SD	1	2	3
1	Self-control	3.41	0.81	-	-	-
2	Meaning in life	4.86	1.50	.532***	-	-
3	Experience of structure in life	4.85	1.03	.527***	.646***	-
4	Personal need for structure	3.50	0.73	.086	−.050	.107*

* $p < .05$, ** $p < .01$, ***$p < .001$

Indirect effect: 0.49, SE = 0.06, 95% CI [0.37; 0.63]
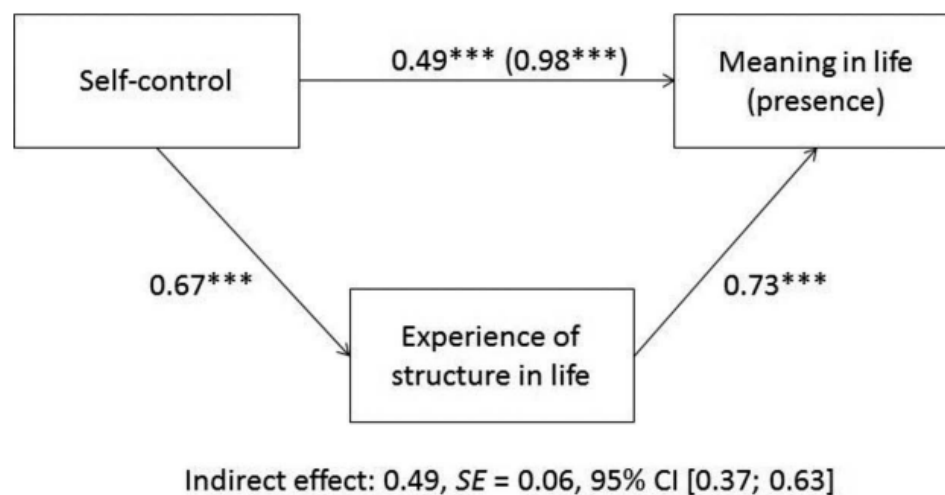
Figure 2. Mediation analysis, Study 3.

Next, we tested whether the indirect effect of trait self-control on meaning in life via experience of structure is moderated by PNS. Specifically, we examined whether the "b path" of the mediation model (effect of the experience of structure on meaning) is moderated by PNS (Figure 3). We conducted a moderated mediation analysis using the process macro (Hayes), model 13, where meaning in life is the dependent variable, trait self-control is the independent variable, experience of structure is the mediator and PNS is the moderator. The underlying model and the results of these analyses are depicted in Figure 3. The significant interaction between the mediator (experience of structure) and the moderator (PNS) implies that the indirect effect of trait self-control on meaning via the experience of structure depends on individual differences in PNS (Preacher, Rucker, & Hayes, 2007). Indeed, the interaction effect between the experience of structure and PNS on meaning reached significance ($b = 0.13$, $p = .039$): The positive association between experiencing one's life as having structure and meaning in life is stronger among individuals with a higher (vs. lower) personal need for structure. We estimated conditional indirect effects in individuals with lower (1 *SD* below mean) and higher (1 *SD* above mean) PNS scores. The indirect effect of trait self-control on meaning in life via the experience of structure was stronger among high-PNS (0.56, 95% CI [0.41; 0.72]) than low-PNS (0.44, 95% CI [0.30; 0.57]) individuals. Hence, even though the effect of trait self-control on meaning is not moderated by PNS, the indirect effect is: The role of experience of structure in life in explaining the positive association between self-control and meaning is stronger in high-(vs. low-) PNS individuals.

Overall, Study 3 replicated the findings of Studies 1 and 2: Trait self-control was positively associated with the sense of meaning in life and this association was mediated by a stronger experience of structure and order in one's life. In addition, Study 3 showed that this mediation effect was moderated by the personal need for structure. High-(vs. low-) PNS individuals are more likely to benefit from having a strong self-control as it allows them to see structure and order in their lives.

Indirect effect at -1 SD of Personal Need for Structure: 0.44, *SE* = 0.07, 95% CI [0.30; 0.57]
Indirect effect at +1 SD of Personal Need for Structure: 0.56, *SE* = 0.08, 95% CI [0.41; 0.72]
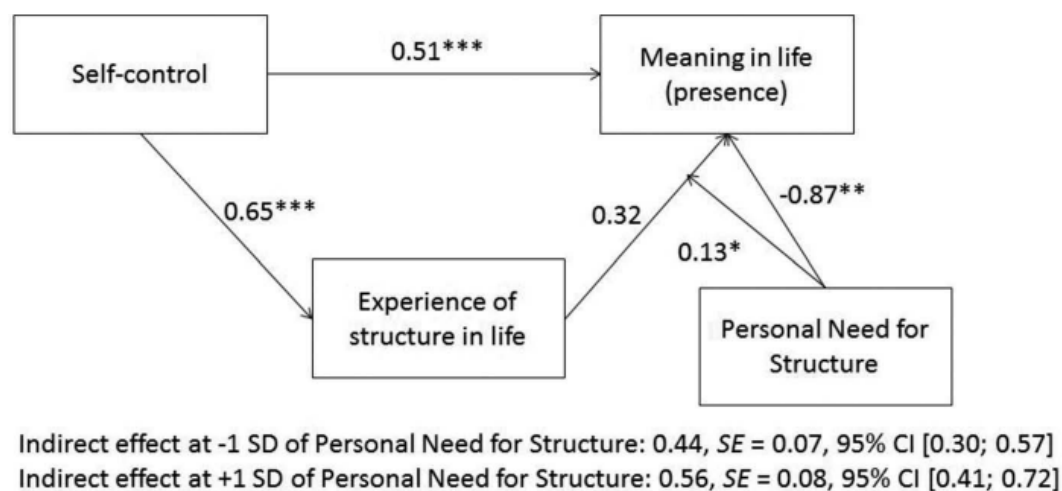
Figure 3. Moderated mediation analysis, Study 3.

General discussion

The perception of one's life as meaningful represents an important predictor of positive life outcomes. Greater reports of meaning in life are associated with social attractiveness, lower risks of divorce and decreased mortality (Hill & Turiano, 2014; Stavrova & Luhmann, 2016; Stillman, Lambert, Fincham, & Baumeister, 2011). Meaning in life plays a crucial role in lay theories of a "good life" and is closely linked to higher life satisfaction and affective well-being (King et al., 2006; King & Napa, 1998). But why are some people more likely to perceive their life as being meaningful than others? Given the importance of goal progress as well as a sense of structure and order in the theoretical literature on meaning in life (Baumeister & Vohs, 2002; Heintzelman & King, 2014; Martela & Steger, 2016), the present research explored the associations between self-control and perceived meaning.

We assumed that high self-control individuals might be more successful in goal pursuit and more likely to organize their lives in a way that facilitates the perception of coherence, continuity, and comprehensibility that can ultimately contribute to the meaning-making process. Across three studies (N = 1,213), trait self-control was positively associated with a stronger sense of meaning in life. This association was robust against controlling for life satisfaction and affective well-being, as well as individual differences in the search for meaning. Individuals with higher scores in trait self-control were not only more likely to report higher levels of meaning in life in general but also to experience a higher sense of daily meaning across a period of one week.

What underlies the positive association between trait self-control and meaning in life? As different perspectives on meaning in life converge on the idea of meaning stemming from the goal fulfillment and a sense of structure and coherence, we explored the role of successful goal pursuit and experience of structure in life as potential mechanisms of the association between trait self-control and meaning (Studies 2 and 3). While trait self-control was associated with both, goal progress and experience of structure in life, only the latter was related to higher meaning. That is, high self-control individuals are likely to have more order and structure in their life, which is in turn related to a stronger perception of their life being meaningful.

We also established that the experience of structure represents the mechanism behind the association between trait self-control and meaning in life in some people more than in other. Specifically, the relationship between self-control and experience of structure is more likely to explain the positive effect of self-control on meaning in life in individuals with higher (vs. lower) scores on the personal need for structure. Given that trait self-control was positively related to meaning in individuals both high and low in personal need for structure, there must be multiple pathways through which trait self-control can contribute to meaning in life. For example, a sense of agency and mastery (Seto, Hicks, Davis, & Smallman, 2015) or social approval and belongingness (Lambert et al., 2013) are associated with both self-control and meaning and might represent additional mediators that we encourage future studies to explore.

The fact that we did not find a significant association between goal progress and meaning in life seems to contradict the theoretical perspectives that consider goals as an integrative part of a meaningful life (Baumeister & Vohs, 2002; Emmons, 2005; Martela & Steger, 2016). We believe that it is the presence of goals rather than a successful goal attainment (which was measured in the present research) that is most likely to promote meaning. Indeed, empirical

research has associated the presence of valued goals with meaning in life (King et al., 2006; for a review on how having different types of goals contributes to meaning, see Emmons, 2005) but remained silent about how reaching one's goals affects the perception of meaning. We speculate that, as long as attained goals are not replaced by new ones, goal attainment might backfire and strip one's life of meaning. Overall, differentiating between the potential effect of the presence of goals and goal attainment on perceived meaning as well as exploring whether and when goal attainment contributes to vs. undermines meaning making represent important questions for future research.

While our results established a robust association between trait self-control and meaning in life (Studies 1 and 2), daily acts of giving in to (vs. resisting) temptations were not associated with meaning (Study 1). Although this finding seems odd at first glance, it is consistent with the idea that trait self-control and acts of resisting temptations might represent psychologically different phenomena. Specifically, trait self-control has been associated with a lower propensity to experience temptations, i.e., desires that conflict with one's long-term goals (also labeled "vice-virtue conflicts") (Hofmann, Baumeister, Förster, & Vohs, 2012). In fact, recent research has suggested that the well-being benefits of trait self-control do not necessarily lie in a stronger willpower but rather in a weaker propensity to experience vice-virtue conflicts (Hofmann et al., 2014). In contrast, experiencing conflicting desires seems to be crucial for resisting them: Logically, only those who feel a temptation can resist it (by engaging in an act of self-control). These findings prompted the idea that trait self-control might promote an "effortless" type of self-control, whereas resisting temptation (also referred to as "state self-control") is almost always effortful (De Ridder et al., 2017). Importantly, while trait self-control has been consistently linked to positive outcomes, state self-control might have negative consequences. For example, acts of resisting temptations have been recently shown to result in a state of depletion and consequently hinder (rather than promote) goal attainment (Milyavskaya & Inzlicht, 2017). Our results are consistent with these findings, showing that trait self-control is associated with a higher sense of meaning in life, while daily acts of resisting temptations are not. On a more general level, the different results pertaining to trait and state self-control found in our research might contribute to a broader literature on the differences between trait and state measures of the same psychological constructs (Fleeson, 2017; Fleeson & Law, 2015). At the same time, it is important to note that a non-significant finding obtained in a single study cannot be taken as good evidence of a null-effect. Hence, more studies examining the associations between trait and state self-control and meaning in life using daily diary and experience sampling methodology are needed to be able to draw solid conclusions about their differences and similarities.

An important limitation of the present findings is that they tell little about causality. Drawing from existing theoretical literature, we assumed that higher scores in trait self-control lead to increased meaning. Indeed, in the daily diary study (Study 1), trait self-control measured at the beginning of the week predicted the experiences of daily meaning throughout the week. It is however also possible that the presence of meaning contributes to self-control development over time. In fact, research in personality development has shown life satisfaction to contribute to personality maturation (e.g., increases in conscientiousness) across adulthood (Specht, Egloff, & Schmukle, 2013). Hence, it might be worthwhile to examine whether baseline sense of meaning in life is related to the developmental trajectory of trait self-control.

A similar limitation pertains to the mediation analyses that are based on cross-sectional data and are therefore inherently limited. Specifically, a strong conceptual and empirical similarity between the mediator (experience of structure) and the dependent variable (meaning in life) (Martela & Steger, 2016) might raise the question whether experience of structure is not a source but a consequence of a higher meaning in life. However, previous experimental studies have established a causal role of the experience of structure in the perception of meaning in life (Heintzelman et al., 2013), providing support to our interpretation of the present findings. Nevertheless, we encourage future studies to extend the present findings using longitudinal mediation designs or experimental manipulations of the proposed psychological process using a "causal chain" approach (Spencer, Zanna, & Fong, 2005).

To conclude, while existing literature on self-control has mainly focused on its role in successful goal pursuit, the present findings suggest that the benefits of trait self-control might go beyond that. Trait self-control is associated with a sense of structure, order, and coherence in one's life and, consequently, with a stronger sense of meaning.

Notes

1. The negative association between trait self-control and search for meaning was robust against controlling for presence of meaning and life satisfaction ($r = -.14$, $p = .004$). The negative zero-order correlation between trait self-control and meaning search emerged in Study 2 as well, however, it vanished ($r = -.07$, $p = .24$) when controlling for meaning presence. Therefore, we decided not to further discuss the relationships between trait self-control and search for meaning.
2. Modeling only the intercept as random produced the same results (daily happiness: $b = .35$, $p < .001$; self-control: $b = .90$, $p < .001$).
3. Modeling only the intercept as random produced the same results ($b = .03$, $p = .20$).
4. Interestingly, compared to the analyses without the control variables (Model 2a, Table 3), including the control variables (Model 2b, Table 3) made the effect of goal progress on meaning in life turn negative ($\beta = -.10$, $p = .018$). Additional analyses showed life satisfaction to be responsible for this: At equal levels of life satisfaction, making progress towards one's goal might undermine the perception of meaning in life.

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Disclosure statement

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