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Personal need for structure shapes the perceived impact of reduced personal control

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ABSTRACT

Control is a fundamental motive in people's lives and previous research converges on the notion that lack of control is aversive because it undermines epistemic beliefs in the nonrandomness of the world. A key motivation underlying control is therefore the need to perceive the world as structured. However, strong individual differences exist in the extent to which people need structure. Based on this, we reasoned that if structure is indeed a key motive underlying control motivation, instances of low control should be more impactful for people with a high need for structure. We tested this logic in three studies. Results confirmed that participants with high personal need for structure evaluated a control-threat as more important and more negative than those with low personal need for structure. Need for structure did not impact evaluations of instances of control-affirmation. The current research shows that control is indeed important, but even more so for people with a high need for structure.

1. Introduction

Control has long been considered to be a fundamental motive and a crucial dimension of people's lives. The extent to which an individual has personal control—and is able to effectively interact with the environment in order to obtain positive outcomes and prevent negative ones—has far-reaching consequences for psychological and physical well-being (Heckhausen & Schulz, 1995; Landau et al., 2015; Thompson & Spacapan, 1991; see also Burger, 1992, Pittman & Pittman, 1980). People thus strive to be in control and they enjoy this experience. At the same time, however, they are regularly faced with unpredictable disruptions of all sorts and levels of intensity. Given the importance of personal control, this poses an interesting question: How do people deal with the inevitable fluctuations in personal control without succumbing to helplessness or depression (Maier & Seligman, 1976; Sedek & Kofta, 1990)?

Over the course of almost four decades, various theories have addressed the importance of resorting to some form of secondary or indirect control as a response to personal control-threats (Heckhausen & Schulz, 1995; Langer, 1975; Rothbaum et al., 1982; Skinner, 1995). This means that when people experience a threat to personal control and cannot directly regain it, they will try to regain a sense of control in a secondary, or indirect, way (e.g., via illusory control or through the search of predictability and understanding; Langer, 1975; Rothbaum et al., 1982; see also Helzer & Jayawickreme, 2015).

Secondary control can thus be seen as a way to compensate for a lack of personal control. Importantly, Compensatory Control Theory (CCT) posits that personal control and "compensatory" (i.e., secondary) control are functionally equivalent and therefore substitutable (Kay et al., 2008; Landau et al., 2015). This is because the primary psychological motive is not control per se but structure—or more specifically, the need to perceive the world as orderly, structured, and predictable (Kay et al., 2008; Landau et al., 2015).

Specifically, CCT argues that a situation in which an individual lacks personal control is considered aversive first and foremost because it undermines epistemic beliefs in the nonrandomness of the world (Kay et al., 2009; Landau et al., 2015; Landau et al., 2018; Whitson & Galinsky, 2008). In line with this notion, studies show that control-threats increase the motivated search for "structured interpretations of the world" (Landau et al., 2015, p.4). These interpretations can be found within the context of the domain within which one lacks control, but—importantly—these can also be found in unrelated domains (e.g.,

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Whitson & Galinsky, 2008).

A substantial body of research (see Landau et al., 2015) provides evidence for the notion that control-threats lead to such "non-specific structure affirmation". This ranges from preference for hierarchy (Friesen et al., 2014) to conspiracy beliefs (Whitson & Galinsky, 2008), to preferences for order-providing scientific theories (Rutjens et al., 2013), and structured consumer products (Cutright, 2012). In addition, direct threats to perceptions of structure or order, such as reminders of randomness and disorder, invoke a *similar* motivational search for non-specific structure (Kay et al., 2010; Meijers & Rutjens, 2014; Rahinel et al., 2016; Rutjens et al., 2013). Moreover, perceptions of structure can also affect perceptions of *personal control*: Being part of a stable and predictable organization leads to higher levels of personal efficacy perceptions (Proudfoot & Kay, 2018).

To summarize, CCT maintains that people's sense of personal control "rests on a view of the external world as structured as opposed to disordered" (Landau et al., 2018, p.72), and explains control motivations in terms of a more fundamental need for order and structure. Importantly, this means that any individual differences in the extent to which people possess such a need should have an impact on the perceived importance of control. Interestingly, then, many scholars have argued that there exist strong individual differences in the extent to which people crave or desire structure. Testimony to this idea are various well-researched scales that focus on differences in the extent to which people need order and structure, including Personal Need for Structure (Neuberg & Newsom, 1993), Need for Cognitive Closure (Webster & Kruglanski, 1994), Preference for Consistency (Cialdini et al., 1995), and Tolerance of Ambiguity (Budner, 1962).

Personal Need for Structure seems particularly relevant, as it appears to come closest to how CCT defines structure: Personal need for structure can be defined as the need for simple, clear, predictable, and consistent interpretations of the world, to make it easier to navigate through complex realities (Landau et al., 2015; Neuberg & Newsom, 1993). Individual differences in the extent to which people desire such interpretations of the world are well-documented (Cutright, 2012; Friesen et al., 2014; Landau et al., 2015; Rietzschel et al., 2014). For example, people with high (vs. low) personal need for structure prefer simpler categories when sorting information (Neuberg & Newsom, 1993, Study 3) and more order in design (e.g., framed vs. unframed paintings; Cutright, 2012, Study 3; see also Gocłowska et al., 2017). Moreover, people with high (vs. low) personal need for structure have a stronger motivation to manage existential anxiety (Landau et al., 2004) and they are more creative when task instructions are structured (vs. unstructured; Rietzschel et al., 2014; see also Gocłowska et al., 2014).

2. Goal of the current research

Taken together, we notice that an important *empirical* piece of the puzzle is missing from the current compensatory control literature: If people differ in the extent to which they need structure (Neuberg & Newsom, 1993), and structure underlies compensatory control processes (Kay et al., 2009; Landau et al., 2015), then instances of low control should be evaluated as more problematic and as more aversive among people with a high personal need for structure. For these people, striving to be in control should be an *even more important* motivation than for those with a low personal need for structure. Thus, while lack of personal control generally can be assumed to be an important and unpleasant experience, we expect this to be more important and unpleasant for people with high vs. low need for structure (for a graphical illustration of this logic, see Fig. 1).

This prediction was tested in three studies, utilizing samples from different populations (Dutch undergraduate students and British Prolific Academic participants). In Study 1, we measured Personal Need for Structure (Neuberg & Newsom, 1993), and subsequently asked participants to recall and then rate experiencing lack of control in terms of its importance and valence. In Studies 2–3, we replicated and extended Study 1 by additionally testing evaluations of experiences characterized by high levels of control. All studies utilized a recall paradigm to manipulate personal control (see Method sections for details). Past research has demonstrated this paradigm to be effective at manipulating perceptions of control (e.g., Cutright, 2012; Kay et al., 2008; Ma & Kay, 2017; Rutjens et al., 2010; Shepherd et al., 2011; Whitson & Galinsky, 2008).

We report all measures, manipulations, and exclusions. We aimed for sample sizes of at least 75 per experimental condition and for Study 1 we collected as much data as possible within the available lab-time (approximately 2 weeks). Additionally, we conducted sensitivity power analyses for all studies using G*Power (Faul et al., 2009). All studies were approved by the Psychology Research Ethics Committee at Leiden University (The Netherlands) and all data are available on request on the DataVerse repository: https://dataverse.nl/dataverse/SocPsy.

3. Study 1

Study 1 tested whether lack of control is perceived as more important and more negative by participants with high vs. low personal need for structure. Specifically, the goal of this first study was to test whether there is a correlation between need for structure and subjective evaluations of a lack of control experience.

3.1. Method

Participants ($N = 161$: 143 females, 18 males; $M_{age} = 20.54$, $SD_{age} = 4.67$, 3 missing) were recruited at Leiden University.[1] A sensitivity power analysis with a two-tailed alpha of .05 and 80% power, showed that this sample size enables us to detect effects with $\beta = .22$. Data were collected in 2016.

Participants first filled out the Personal Need for Structure scale (e.g., "I enjoy having a clear and structured mode of life", Neuberg & Newsom, 1993; $\alpha = .87$, *skewness* $= -0.05$, $SE = .19$, *kurtosis* $= -0.31$, $SE = .38$). Then, they continued to the lack of control manipulation. Participants were first asked to recall and write about an event in which they had no control.[2] Next, participants were instructed to write down three arguments in favor of the fact that the future is uncontrollable and unpredictable. This procedure has been routinely used in previous research (see e.g., Rutjens et al., 2010; Rutjens et al., 2013). Following that research, the second step in the manipulation is included to enhance the potency of the manipulation of low control, by highlighting the uncontrollable and unpredictable nature of events not only in the present but also in the future (note that Study 3 omitted this part of the manipulation).

Then, we asked participants to once again recall the situation they described, after which we presented them with measures of perceived *control* and *order*. These measures were included in order to compare the means with previous research that included a low control condition (Rutjens et al., 2013; we observed very similar means, see Table 1a). First, we measured specific control over the recalled situation with "How much control did you have in that situation?" from 1 (*none*) to 7 (*a lot*). Next, we measured generalized control perceptions with "Are you the actor in, or the director of, your own life?" from 1 (*actor*) to 7 (*director*) (cf. Rutjens et al., 2010). This measure was included to test whether the recall of a specific instance of low control would translate to generalized perceptions of low control (see e.g., Rutjens et al., 2010, 2013). Our prediction was that both control ratings would be relatively low,

[1] Note that the study was completed in Dutch and the procedure and items described are translations from the original Dutch.

[2] In this and subsequent studies, we did not specify the valence of the event (i.e., "recall an *unpleasant* event" like in Rutjens et al., 2010), to avoid floor effects in valence evaluations.

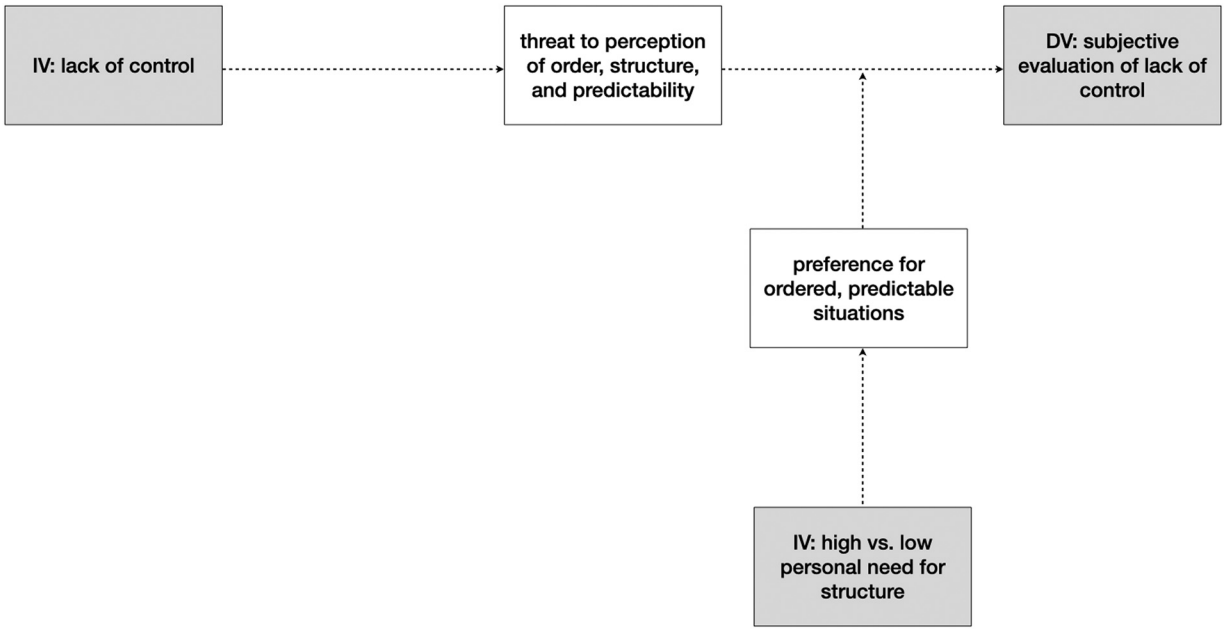

Fig. 1. Conceptual model of the impact of personal need for structure on the subjective evaluation of lack of control (i.e., importance and valence). The grey boxes show the independent (IV) and dependent variables (DV) of the studies; the white boxes show the assumed psychological state resulting from lack of control and high (vs. low) need for structure.

Table 1a
Manipulation checks: Means (*SD*s) and regression results with standardized PNS as predictor, Study 1.

Variable	*M* (*SD*)	*B*	95% CI	β	*t*	*p*	R^2
Specific control	1.81 (0.96)	0.15	[0.001, 0.30]	.16	1.99	.048	.02
Generalized control	4.25 (1.42)	−0.17	[−0.39, 0.06]	−.12	−1.47	.142	.01
Orderly world	2.87 (1.27)	0.08	[−0.12, 0.28]	.06	0.75	.452	.004
Coincidence	4.21 (1.23)	−0.03	[−0.23, 0.16]	−.03	−0.33	.745	.001

Table 1b
Importance and valence: Means (*SD*s) and regression results with standardized PNS as predictor (regression 1) and controlled for specific control-ratings (centered; regression 2), Study 1.

Variable	*M* (*SD*)	B	95% CI	β	*t*	*p*	R^2
Regression 1							
Importance	4.57 (1.34)	0.44	[0.24, 0.64]	.32	4.32	<.001	.11
Valence	2.33 (1.24)	−0.32	[−0.51, −0.13]	−.25	−3.27	<.001	.06
Regression 2							
Importance	–	0.46	[0.26, 0.67]	.34	4.51	<.001	.12
Specific control	–	−0.15	[−0.36, 0.06]	−.11	−1.45	.150	–
Valence	–	−0.35	[−0.54, −0.16]	−.28	−3.60	<.001	.09
Specific control	–	0.21	[0.02, 0.41]	.16	2.13	.035	–

independently of need for structure, because the situation is equally uncontrollable for both high vs. low need for structure participants. Subsequently, we measured order perceptions with "The world is an orderly place" and "The events that happen in my life are mostly coincidental" (reverse coded) from 1 (*not at all*) to 7 (*very much*). These order perceptions were included to test whether low control would be associated with low order perceptions (i.e., following the logic that low control is a threat to the perception that the world is an orderly place, Kay et al., 2008; Landau et al., 2015). We thus predicted that the recall would lower order perceptions, but we were not completely sure whether need for structure would affect this. One possibility is that order perceptions are lower for high (vs. low) need for structure participants (because of increased threat to the need for order); another possibility is that order perceptions are independent of need for structure (because it is about the impact of low order, not necessarily the low order itself). Next, participants completed the main dependent variables: The *importance* and the *valence* ascribed to the uncontrollable situation. Participants were asked "How do you feel about the fact that you did not have control in the situation back then?". On bipolar 7-point scales, they rated the *importance* of the situation with "This is…" on *unimportance-importance*, *of little significance-of great significance*, *unproblematic-problematic* (α = .82). Next, they evaluated the *valence* of the situation with "This is…" *bothersome-nice*, *unpleasant-pleasant*, *unpleasurable-pleasurable*[3] (α = .95). Finally, we asked participants to report their age and

[3] In Dutch this item was "onprettig-prettig", which is difficult to translate into English (see also Study 2).

gender, before debriefing them. Participants were then rewarded with course credit or a monetary compensation. The study took approximately 10 min and was part of a 45-min testing session, for which participants received €5, − or course credit (depending on the preference of the participant).

3.2. Results

After recoding, we averaged and standardized the Personal Need for Structure (PNS) scale. Then, we ran regression analyses with standardized PNS scores on the control and order perception checks (Table 1a), followed by regressions on the main variables; importance and valence (Table 1b). Results showed a positive effect of PNS on control over the situation, and no effect of PNS on generalized control. In addition, PNS did not affect the order perception items. Thus, while specific ratings of control over the recalled situation were low, they were somewhat higher for participants with high need for structure—a result we did not anticipate. PNS did not affect more generalized control perceptions nor did it affect order perceptions.

More importantly, there was positive effect of PNS on importance and a negative effect of PNS on valence. This confirmed our predictions, but because of the unanticipated positive effect of PNS on the control ratings, we ran two additional regressions where we included centered control-ratings to statistically control for the variance of this measure. These analyses showed comparable effects: A positive effect of PNS on importance, with no effect of control-ratings. In addition, it showed a negative effect of PNS on valence, with a positive effect of control-ratings. These results thus show, as predicted, that the higher the need for structure, the *more important* the situation was rated and the *more negatively* it was evaluated. These effects remain when we add the cantered control ratings in the regressions.

3.2.1. Coding the stories

An alternative explanation for the current findings could be that participants with different levels of personal need for structure recalled different types of situations (i.e., instances of low control that differed in terms of valence and importance). To address this possibility, two independent coders—blind to the hypotheses of the study—each coded all stories in terms of experienced control in the situation, importance, and valence. They used the same scales as participants did, but then focused on perspective of the person that described the situation.

The coders read the written paragraphs of each participant and coded control with: "How much control did the person have in this situation" on a scale from 1 (*none*) to 7 (*a lot*). Then, on the same importance and valence items as in the study, they coded: "The person who described the situation recalled this moment. How do you think he/she felt about the fact that he/she did not have control in the situation back then?" Moreover, to get a sense of the type of situations that were recalled, this was coded as well (i.e., the top-4 of most frequently described topics were communication in relations, transport/travel, study-related events, and health).

After establishing good reliability of the coding (control $\alpha = .80$, importance $\alpha = .77$, valence $\alpha = .86$[4]), we ran a regression with standardized PNS of the participants on the coding of the stories. Results showed that the stories did not differ as a function of PNS on perceptions of control: $B = 0.17$, 95% CI [−0.07, 0.40], $\beta = .11$, $t(159) = 1.39$, $p = .167$, importance: $B = 0.09$, 95% CI [−0.09, 0.28], $\beta = .08$, $t(159) = 0.99$, $p = .325$, and valence: $B = -0.08$, 95% CI [−0.26, 0.10], $\beta = -.07$, $t(159) = -0.91$, $p = .365$. Thus, even though we find that high (vs. low) need for structure participants rate their low control experience as more important and more negative, these differences were not observed by the coders. Interestingly, the ratings of participants did correlate significantly with the ratings of the coders (control: $r = 0.50$, $p < .001$; importance: $r = .39$, $p < .001$; valence $r = .54$, $p < .001$). This suggests that variation in control, importance, and valence can be observed by the coders and that the variation due to PNS in importance and valence seems indeed more a matter of subjective experience of the participant.

3.3. Discussion

This first study shows that participants with high need for structure rated an instance of uncontrollability as more problematic (i.e., more important and more negative) than participants with low need for structure. Additional coding showed that the type of event recalled did not seem to differ in terms of importance and valence as a function of need for structure. Also statistically controlling for variance in control-ratings did not change the pattern of results. These results thus support the notion that control is perceived as more important among participants with high vs. low personal need for structure.

4. Study 2

The aim of Study 2 was to replicate Study 1 and additionally test evaluations of experiences of *high* levels of personal control. We reasoned that if lack of control is more impactful for those with high vs. low need for structure, then being in control might also be perceived as more important and more pleasant for people with high (vs. low) need for structure.

4.1. Method

Participants ($N = 300$[5]) were recruited on Prolific Academic (selection criteria: UK participants, native English, age between 18 and 65, approval rate higher than 95%). Four participants were excluded from analyses, because they did not describe any memory. We report analyses on the remaining 296 (230 females, 64 males, 2 other/rather not say; $M_{age} = 37.22$, $SD_{age} = 11.34$). A sensitivity power analysis with a two-tailed alpha of .05 and 80% power, showed that this sample size enables us to detect effects in a model with $f^2 = 0.03$. Data were collected in 2017.

All participants first completed the Personal Need for Structure scale ($\alpha = .76$; *skewness* $= -0.51$, *SE* $= .14$, *kurtosis* $= 0.77$, *SE* $= .28$), after which they were asked to recall a time when they either did or did not have control: participants were randomly assigned to either the same control-threat manipulation as in Study 1, or to a control-affirmation condition. As in Study 1, they additionally were instructed to write down three arguments in favor of the fact that the future is (un) controllable and (un)predictable (Rutjens et al., 2013).

Manipulation checks and dependent measures were English translations of the same items as were used Study 1, with two exceptions. First, we rephrased the order perception items in more motivational terms (i.e., "I wish that the world would be a more orderly place" and "I wish that the events that happen in my life would be less coincidental") to test if more in-the-moment order *motivations* (as opposed to *perceptions*) would be impacted by control-threat (which was not the case for the general perceptions of Study 1). Furthermore, because the original Dutch phrasing of the last item was hard to translate to English (see Footnote 3), we reformulated the last valence item as "This feels…" *negative-positive* (from 1 to 7). Reliability of importance and valence was reasonable to good ($\alpha = .67$; $\alpha = .92$, respectively).

The study took approximately 10 min and after completion, participants received a monetary compensation of £0,85.

4.2. Results

We conducted regression analyses with Control (threat = 1,

[4] Due to coding error, three stories were coded by one coder only.

[5] Of 331 participants who started, 300 completed the study.

Table 2a
Manipulation checks: Means (*SD*s) as a function of control (threat vs. affirmation), Study 2.

	Control-threat	Control-affirmation
Control over situation	1.79[a] (1.02)	6.22[b] (0.96)
Generalized control	4.45[a] (1.48)	5.36[b] (1.51)
Orderly world	4.97[a] (1.47)	5.05[a] (1.24)
Coincidence	4.16[a] (1.50)	4.03[a] (1.40)

Note. Means with different subscripts differ at $p < .001$ (see also Table 2b).

affirmation = −1) as between subjects factor and standardized need for structure (PNS) as continuous moderator on the dependent measures.

First, we analyzed the manipulation checks (see Table 2a for means/*SD*s and Table 2b for regression results). On control over the situation we observed a main effect of Control, no main effect of PNS, nor a Control-PNS interaction. Similarly, on generalized control there was a main effect of Control, no main effect of PNS, nor a Control-PNS interaction. From this, we conclude that the control manipulation was successful. Next, we analyzed the order motivation items. On the orderly world item there was a main effect of PNS, no main effect of Control, nor a Control-PNS interaction. Similarly, on the coincidence item there was a main effect of PNS, no main effect of Control, nor a Control-PNS interaction. These results indicate that higher PNS relates to higher order motivation. This is not surprising as the order items in the current study were designed specifically to measure the *need* for order, whereas in Study 1, we measured *perceptions* of order and found no relation with PNS.

4.2.1. Main analyses

Next, we tested our main prediction regarding *importance* and *valence* (see Table 2c for regression results). On importance, we found no main effect of Control and a main effect of PNS. These effects were qualified by a Control-PNS interaction. To unpack the interaction, we ran regressions with 1-*SD* above and below the PNS mean (labeled high vs. low need for structure; Aiken & West, 1991; see Fig. 2a). This showed that for participants with low PNS, there was no difference in reported importance between the control-threat and control-affirmation condition, whereas for participants with high PNS, control-threat was rated as more important than control-affirmation. In addition, within the control-threat condition, high PNS participants rated the event as more important than the low PNS participants. Within the control-affirmation, there was no difference in importance as a function of PNS. Thus, high PNS participants in the control-threat condition rated the situation as more important, while the other means are the same. Next, on valence we found a main effect of Control, and no main effect of PNS. These effects were qualified by a Control-PNS interaction. Regressions with 1-*SD* above/below the PNS mean (see Fig. 2b) showed that for both low and high PNS participants, control-threat was rated more negatively than the control-affirmation. More importantly, within the control-threat condition, high PNS participants rated the event as more negative than the low PNS participants. Within the control-affirmation, there were no differences in valence as a function of PNS. Thus, the higher the need for structure, the more negative lack of control was evaluated. PNS did not influence how participants evaluated an instance of having high levels of control.

In sum, supporting our prediction and replicating Study 1, we found that a lack of control is rated as more important and more negative by individuals with a high vs. low need for structure. Interestingly, no such differences were observed in the control-affirmation condition. We return to this issue in the discussion.

It is important to note that the control manipulations of Studies 1–2 included an argumentation task on the un/controllability and un/predictability of the future (following Rutjens et al., 2010), which may be conceptually related to PNS. To rule out the possibility that (part of) our

Table 2b
Manipulation checks: Regression results with control (threat vs. affirmation), PNS, control × PNS as predictors, Study 2.

		B	95% CI	β	*t*	*p*
Specific control	Control	−2.21	[−2.33, −2.10]	−.91	−38.24	<.001
	PNS	−0.004	[−0.12, 0.11]	−.001	−0.06	.951
	Control × PNS	−0.04	[−0.16, 0.07]	−.02	−0.72	.471
Generalized control	Control	−0.46	[−0.63, −0.29]	−.29	−5.26	<.001
	PNS	0.06	[−0.12, 0.23]	.04	0.63	.529
	Control × PNS	0.02	[−0.15, 0.20]	.02	0.27	.787
Orderly world	Control	−0.06	[−0.19, 0.08]	−.04	−0.84	.405
	PNS	0.70	[0.57, 0.84]	.52	10.33	<.001
	Control × PNS	0.11	[−0.03, 0.24]	.08	1.60	.110
Coincidence	Control	0.06	[−0.11, 0.22]	.04	0.68	.498
	PNS	0.35	[0.18, 0.51]	.24	4.18	<.001
	Control × PNS	0.06	[−0.11, 0.22]	.04	0.68	.495

Overall model for specific control: $F(3,292) = 487.90$, $p < .001$, $R^2 = .83$, $f^2 = 4.88$.
Overall model for generalized control: $F(3,292) = 9.33$, $p < .001$, $R^2 = .09$, $f^2 = 0.10$.
Overall model for orderly world: $F(3,292) = 37.63$, $p < .001$, $R^2 = .28$, $f^2 = 0.39$.
Overall model for coincidence: $F(3,292) = 6.37$, $p < .001$, $R^2 = .06$, $f^2 = 0.06$.

Table 2c
Importance and valence: Regression results of control (threat vs. affirmation), PNS, and control × PNS as predictors, Study 2.

		B	95% CI	β	*t*	*p*
Importance	Control	0.13	[−0.03, 0.28]	.09	1.59	.112
	PNS	0.30	[0.14, 0.45]	.21	3.72	<.001
	Control × PNS	0.19	[0.04, 0.35]	.14	2.41	.017
Valence	Control	−1.37	[−1.53, −1.20]	−.69	−16.39	<.001
	PNS	−0.08	[−0.24, 0.09]	−.04	−0.93	.351
	Control × PNS	−0.19	[−0.36, −0.03]	−.10	−2.29	.023

Overall model for importance: $F(3,292) = 8.01$, $p < .001$, $R^2 = .08$, $f^2 = 0.09$.
Overall model for valence: $F(3,292) = 92.08$, $p < .001$, $R^2 = .49$, $f^2 = 0.96$.

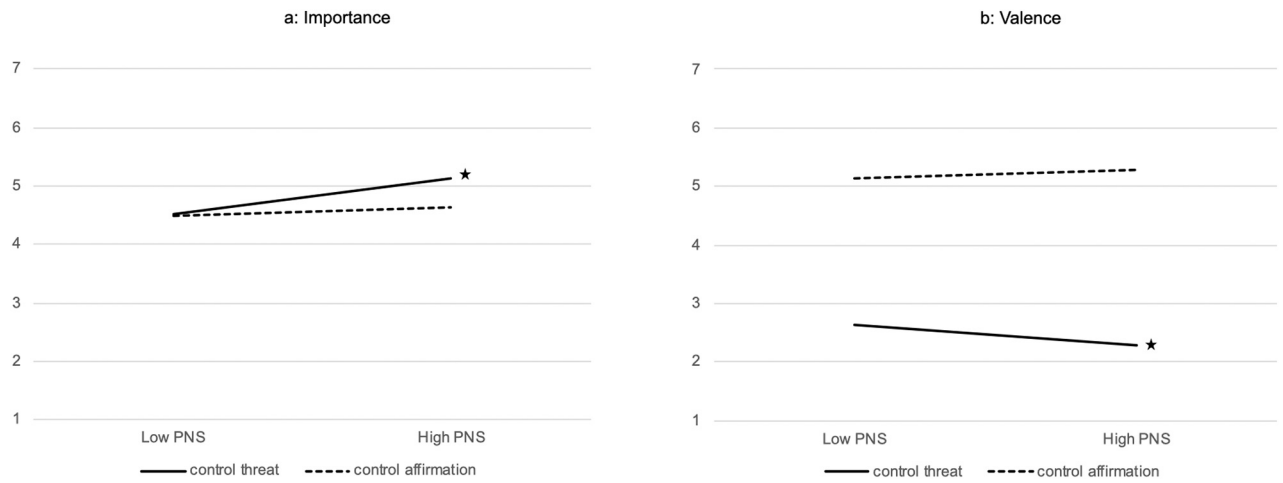

Fig. 2. Importance (2a) and Valence (2b) of the recalled situation: Estimated marginal means as a function of Control (threat vs. affirmation) and low (−1 SD) vs. high (+1 SD) Personal Need for Structure (PNS), Study 2.

Note.

Fig. 2a**: Importance.** Higher importance for high vs. low PNS in the control-threat condition, $B = 0.49$, 95% CI [0.25, 0.73], $\beta = .31$, $t(150) = 4.04$, $p < .001$, but no PNS-effect in the control-affirmation condition, $B = 0.11$, 95% CI [−0.10, 0.30], $\beta = .09$, $t(142) = 1.04$, $p = .301$. Moreover, higher importance in the control-threat vs. control-affirmation for high PNS, $B = 0.32$, 95% CI [0.10, 0.54], $\beta = .23$, $t(292) = 2.83$, $p = .005$, but no difference for low PNS, $B = -0.07$, 95% CI [−0.29, 0.16], $\beta = -.05$, $t(292) = -0.58$, $p = .561$.

Fig. 2b**: Valence.** More negative valence for high vs. low PNS in the control-threat condition, $B = -0.27$, 95% CI [−0.46, −0.08], $\beta = .22$, $t(150) = -2.74$, $p = .007$, but no PNS-effect in control-affirmation condition, $B = 0.11$, 95% CI [−0.16, 0.39], $\beta = .07$, $t(142) = 0.82$, $p = .414$. Moreover, more negative valence in the control-threat vs. control-affirmation condition for both high and low PNS, $B = -1.17$, 95% CI [−1.41, −0.94], $\beta = -.59$, $t(292) = -9.96$, $p < .001$, and $B = -1.56$, 95% CI [−1.79, −1.32], $\beta = -.78$, $t(292) = -13.17$, $p < .001$, [−1.41, −0.94], $\beta = -.59$, $t(292) = -9.96$, $p < .001$, and $B = -1.56$, 95% CI [−1.79, −1.32], and respectively.

Table 3a
Manipulations checks: Means (*SD*s) as a function of control (threat vs. affirmation), Study 3.

	Control-threat	Control-affirmation
Control over situation	1.61[a] (0.91)	6.33[b] (0.95)
Generalized control	4.46[a] (1.45)	5.05[b] (1.48)
Orderly world	4.96[a] (1.30)	4.87[a] (1.43)
Coincidence	4.05[a] (1.39)	3.90[a] (1.39)

Note. Means with different subscripts differ at $p < .001$ (refer to Table 3b).

effects are explained by this component of the manipulation, Study 3 omitted this argumentation task.

5. Study 3

Study 3 tested whether the findings of Study 2 would replicate without the additional argumentation task that followed the recall procedure in Studies 1 and 2 (in other words, utilizing only the recall paradigm). Predictions were similar to Study 2 and preregistered on the OSF (see https://osf.io/dmuab/?view_only=946757e8757a4e69bace7ae7e3c6ad23).

5.1. Method

Participants ($N = 351$[6]) were recruited on Prolific Academic (selection criteria: UK participants, native English, age between 18 and 65, approval rate higher than 95%, did not participate in Study 2). A total of 9 participants were excluded from analyses, because they did not describe a memory. We report analyses on the remaining 342 (249 females, 93 males; $M_{age} = 36.13$, $SD_{age} = 12.21$). A sensitivity power analysis with a two-tailed alpha of .05 and 80% power, showed that this sample size enables us to detect effects in a model with $f^2 = 0.03$. Data were collected in 2019.

After completing the Personal Need for Structure scale ($\alpha = .77$; *skewness* $= -0.18$, *SE* $= .13$, *kurtosis* $= 0.26$, *SE* $= .26$), participants were randomly assigned to recall a control-threat or affirmation condition—without the argumentation task from Studies 1–2. After the recall, participants rated perceptions of control, order motivations, and evaluation of the situation in terms of importance ($\alpha = .65$) and valence ($\alpha = .92$).

The study took approximately 10 min and after completion, participants received a monetary compensation of £0,85.

5.2. Results

We analyzed the data in the same way as in Study 2. First, we analyzed the manipulation checks (see Table 3a for means/*SD*s and Table 3b for regression results). On control over the situation, results showed a main effect of Control, no main effect of PNS, nor a Control-PNS interaction. Similarly, on generalized control, we found a main effect of Control, no main effect of PNS, nor a Control-PNS interaction. Thus, the control manipulation was successful. Next, on the orderly world item, there was a main effect of PNS, no main effect of Control, nor a Control-PNS interaction. Finally, on the coincidence item, there was a main effect of PNS, no main effect of Control, nor a Control-PNS interaction. Thus, like before, those with higher PNS have higher order motivations.

5.2.1. Main analyses

Next, we analyzed the main dependent variables (see Table 3c for the regression results). On importance, we found no main effect of Control, a main effect of PNS, and the predicted Control-PNS interaction. Regressions with 1-*SD* above/below the PNS mean (see Fig. 3a) showed that for high PNS participants, control-threat was rated as more important than control-affirmation, whereas for low PNS participants, there was no difference in reported importance between the control-threat and control-affirmation condition. In addition, within the control-threat condition, high PNS participants rated the event as more important than low PNS participants. Within the control-affirmation,

[6] Of 378 participants who started, 351 completed the study.

Table 3b
Manipulation checks: Regression results with control (threat vs. affirmation), PNS, control × PNS as predictors, Study 3.

		B	95% CI	β	*t*	*p*
Specific control	Control	−2.36	[−2.46, −2.26]	−.93	−46.80	<.001
	PNS	−0.06	[−0.16, 0.04]	−.02	−1.15	.251
	Control × PNS	−0.04	[−0.14, 0.06]	−.02	−0.87	.385
Generalized control	Control	−0.29	[−0.45, −0.14]	−.20	−3.70	<.001
	PNS	−0.11	[−0.27, 0.05]	−.07	−1.37	.171
	Control × PNS	0.003	[−0.16, 0.16]	.002	0.03	.974
Orderly world	Control	0.03	[−0.09, 0.15]	.02	0.43	.665
	PNS	0.78	[0.65, 0.90]	.57	12.55	<.001
	Control × PNS	−0.01	[−0.13, 0.11]	−.01	−0.19	.846
Coincidence	Control	0.06	[−0.08, 0.20]	.04	0.88	.381
	PNS	0.51	[0.37, 0.65]	.37	7.25	<.001
	Control × PNS	0.03	[−0.11, 0.17]	.02	0.45	.656

Overall model for specific control: $F(3,338) = 732.19$, $p < .001$, $R^2 = .87$, $f^2 = 6.69$.
Overall model for generalized control: $F(3,338) = 5.31$, $p = .001$, $R^2 = .05$, $f^2 = 0.05$.
Overall model for orderly world: $F(3,338) = 53.87$, $p < .001$, $R^2 = .32$, $f^2 = 0.47$.
Overall model for coincidence: $F(3,338) = 18.02$, $p < .001$, $R^2 = .14$, $f^2 = 0.16$.

Table 3c
Importance and valence: regression results of Control (threat vs. affirmation), PNS, and Control × PNS as predictors, Study 3.

		B	95% CI	β	*t*	*p*
Importance	Control	0.02	[−0.12, 0.17]	.02	0.33	.745
	PNS	0.29	[0.15, 0.44]	.21	3.92	<.001
	Control × PNS	0.19	[0.04, 0.34]	.14	2.56	. 011
Valence	Control	−1.38	[−1.54, −1.23]	−.69	−17.46	<.001
	PNS	−0.06	[−0.22, 0.09]	−.03	−0.79	.428
	Control × PNS	−0.20	[−0.36, −0.05]	−.10	−2.53	.012

Overall model for importance: $F(3,338) = 6.59$, $p < .001$, $R^2 = .06$, $f^2 = 0.06$.
Overall model for valence: $F(3,338) = 103.97$, $p < .001$, $R^2 = .48$, $f^2 = 0.92$.

there was no difference in importance as a function. Thus, replicating Study 2, we find that high PNS participants rate a low control situation as more important.

On valence, we observed a main effect of Control, no main effect of PNS, and the predicted Control-PNS interaction. Regressions with 1-*SD* above/below the PNS mean (see Fig. 3b) showed that for both high and low PNS participants, the control-threat was rated more negatively than the control-affirmation. More importantly, within the control-threat condition, high PNS participants rated the low control event as more negative than low PNS participants. Within the control-affirmation, there were no differences in valence as a function of PNS. Thus, similar to Study 2, we find that the higher the need for structure, the more negative lack of control was evaluated. PNS did not influence how participants evaluated an instance of high personal control.

In sum, study 3 replicates the findings of Study 2, supporting the robustness of the effects and showing that the evaluations of low control are independent of the argumentation task in Studies 1–2.

6. General discussion

Decades of research on control motivation has pointed to the fundamental psychological importance of perceiving oneself to be in control over outcomes in life (e.g., Burger, 1992; Helzer & Jayawickreme, 2015; Kay et al., 2008; Landau et al., 2015; Langer, 1975; Pittman & Pittman, 1980; Rothbaum et al., 1982). This has mainly been done by investigating the cognitive, motivational, and behavioral *consequences* of control-threats to such perceptions of control. The current research simply asked participants to *evaluate* instances of low and high control, which—to our knowledge—makes our studies among the first to focus on the *subjective evaluation* of lack of control. We show that low and high control situations are evaluated as important and lack of control is evaluated as negative. More importantly, we showed that *how* important and negative participants rate a threat to control depends on individual differences in personal need for structure (PNS): Those with a high need for structure evaluated instances of low control as particularly important and aversive.

Our findings fit with recent theorizing that explains control motivation in terms of a more fundamental need for order and structure (Landau et al., 2015). As Landau and colleagues describe: "CCT posits that beliefs implying a predictably structured world are cornerstones of the cognitive infrastructure underlying a confident sense of personal control." (Landau et al., 2018; p.72). In our research, we built on this central idea behind CCT and took it one step further by investigating individual differences in the extent to which people have a need for such beliefs of a predictable and structured world (Neuberg & Newsom, 1993). We reasoned that if structure is a key component underlying control motivation, then low control should be more impactful for people with high versus low need for structure. Three studies—including one preregistered study—support this logic. We thus contribute to previous theorizing by providing empirical evidence for an important but until now untested tenet of CCT, while also informing research on control motivation more generally.

Interestingly, we did not observe any PNS-differences in the control-affirmation conditions in Studies 2–3. One plausible explanation is that people enjoy being in control (which has been found to be the case across cultural contexts; Hornsey et al., 2018), irrespective of their need for structure. Additionally, it is possible that an affirmation of control for many people, particularly those drawn from a WEIRD population (i.e., Western, Educated, Industrialized, Rich, and Democratic; Henrich et al., 2010), comprises a default situation. Thus, participants in the control-affirmation condition may have recalled situations that they considered to be fairly common. Previous research that included a neutral condition provides evidence for this notion, by showing no differences in generalized control perceptions between participants in a high control

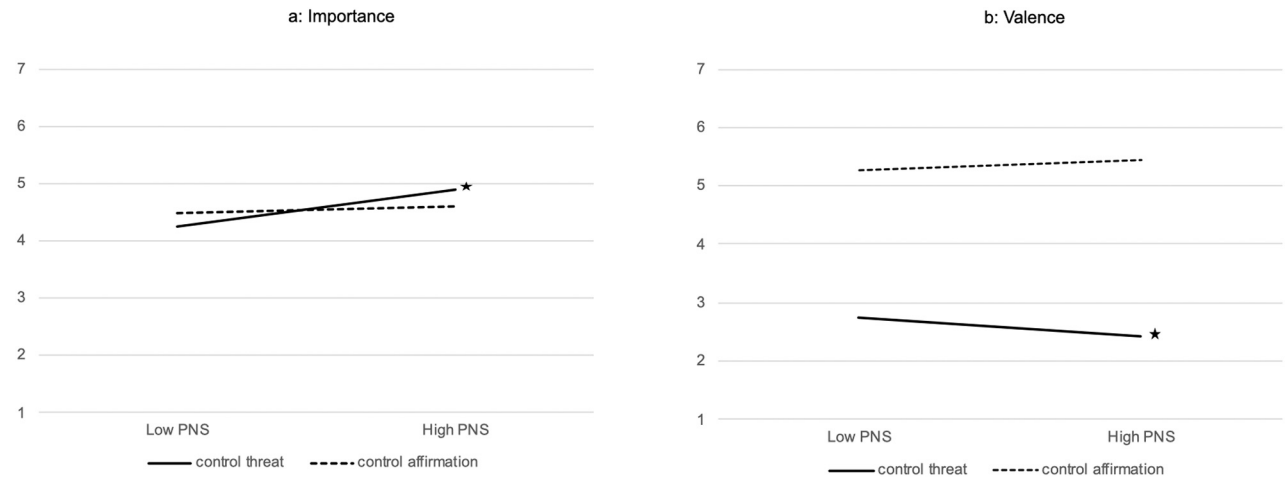

Fig. 3. Importance (3a) and Valence (3b) of the recalled situation: Estimated marginal means as a function of Control (threat vs. affirmation) and low (−1 SD) vs. high (+1 SD) Personal Need for Structure (PNS), Study 3.

Note.

Fig. 3a**: Importance.** Higher importance for high vs. low PNS in the control-threat condition, $B = 0.48$, 95% CI [0.21, 0.76], $\beta = .26$, $t(166) = -3.44$, $p = .001$, but no PNS-effect in the control-affirmation condition, $B = 0.10$, 95% CI [−0.03, 0.23], $\beta = .12$, $t(172) = 1.53$, $p = .128$. Moreover, higher importance in the control-threat vs. control-affirmation for high PNS, $B = 0.22$, 95% CI [0.01, 0.42], $\beta = .15$, $t(338) = 2.04$, $p = .042$, but no difference for low PNS, $B = -0.17$, 95% CI [−0.37, 0.04], $\beta = -.12$, $t(338) = -1.59$, $p = .113$.

Fig. 3b**: Valence.** More negative valence for high vs. low PNS in the control-threat condition, $B = -0.27$, 95% CI [−0.48, −0.06], $\beta = -.19$, $t(166) = -2.49$, $p = .014$, but no PNS-effect in control-affirmation condition, $B = 0.14$, 95% CI [−0.09, 0.37], $\beta = .09$, $t(172) = 1.20$, $p = .233$. Moreover, more negative valence in the control-threat vs. control-affirmation condition for both high and low PNS, $B = -1.58$, 95% CI [−1.81, −1.36], $\beta = .79$, $t(338) = -14.07$, $p < .001$, and $B = -1.18$, 95% CI [−1.40, −0.96], $\beta = -.59$, $t(338) = -10.51$, $p < .001$, respectively.

vs. a neutral condition (Rutjens et al., 2013). Evaluations of such common situations might not be shaped by need for structure, because these are to be expected in daily live and as such they do not necessarily further boost control perceptions.

Our research also fits with a more general perspective on threat (Jonas et al., 2014; Martens and Rutjens, under review) and aligns with evidence suggesting that the impact of threat can depend on individual differences. For instance, people experience less distress after making errors when they are religious (Inzlicht et al., 2009; see also Good et al., 2015; Inzlicht & Tullett, 2010). Similarly, the impact of meaning violations is reduced for people with extreme beliefs (Sleegers et al., 2015). These findings are fairly diverse, but they suggest that that the impact of threat is determined by individual differences in the availability of a "resource" to rely on: Religiosity, extreme convictions, but also chronically low need for structure can serve as a buffer against the impact of a situational threats—even when the threat is not directly related this buffer (see also Landau et al., 2015).

Taken together, our research provides empirical evidence for the idea that structure is a key component in control motivation (Landau et al., 2015) by showing that the perceived importance and valence of control-threat depends on individual differences in need for structure. Our findings not only highlight the importance of individual differences when studying control-threat, they also point to the importance of focusing on the subjective experience of threat. Future research could build on these findings by testing whether these experiential effects will also shape the compensatory efforts resulting from threat: If a control-threat is evaluated as more important and more negative for people with high need for structure, then it may for example also result in a stronger compensatory motivation (e.g., increased illusory pattern perception or conspiracy beliefs after control-threat; Whitson & Galinsky, 2008; but see Friesen et al., 2014, Study 5) or an intensified behavioral responses (e.g., more approach to achieve goals; Greenaway et al., 2015; see also Jonas et al., 2014).

Similarly, an implication of our findings is that particularly individuals with high need for structure might benefit from structure-based interventions in order to alleviate the psychological impact of a threat to personal control. Providing these individuals with either specific or non-specific structure affirmations (Landau et al., 2015) may prove particularly psychologically useful. High PNS individuals who lack control may, however, also be more prone to accept relatively *negative* structure-affirming circumstances, such as accepting a fixed hierarchy even when this means not being able to get a promotion (Friesen et al., 2014) or preferring a pessimistic health belief because it give more order than the hopeful alternative (Rutjens et al., 2013; see also Landau et al., 2015). Future research could test the impact of various structure-based interventions on subjective evaluations of control-threat.

Finally, it is important to point out two limitations of the current research. First, our studies relied on a recall procedure to manipulate personal control. While this method is well-established, it involves a reflection rather than a direct experience of (lack of) control. The included manipulation checks show that the procedure was successful in manipulating control, but future research may want to replicate our findings using more direct methods (e.g., presenting participants with unsolvable problems, Sedek et al., 1993; or by surveying airplane passengers during flight, Rutjens et al., 2010). Second, we relied solely on participants drawn from Western populations (i.e., The Netherlands and the UK). This constrains the generalizability of the current findings (Henrich et al., 2010; Simons et al., 2017), which is important to keep in mind given possible cultural differences in the extent to which people have a need for structure. For example, East Asians generally hold more complex and holistic views of the world than Westerners (Choi & Nisbett, 2000) and a stronger tendency towards dialectical thinking (i.e., tolerance of contradictory beliefs, Peng & Nisbett, 1999). It seems plausible that these cultural differences translate to differences in need for structure, such that more acceptance of contradiction and complexity would be associated with lower need for structure.

7. Conclusion

Control motivation is often explained in terms of a more fundamental need for order and structure (Kay et al., 2008; Landau et al., 2015). Importantly, however, people differ in the extent to which they need order and structure. We have shown that the perceived impact of

control-threat is indeed shaped by personal need for structure: Lacking control is more problematic and more aversive for people with a high personal need for structure. Maintaining control is important, but even more so for people with a high need for structure.

CRediT authorship contribution statement

Marret K. Noordewier: Conceptualization, Methodology, Software, Formal analysis, Writing (original draft). **Bastiaan T. Rutjens**: Conceptualization, Methodology, Writing (review & editing).

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