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Compensatory Control and the Appeal of a Structured World

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People are motivated to perceive themselves as having control over their lives. Consequently, they respond to events and cognitions that reduce control with compensatory strategies for restoring perceived control to baseline levels. Prior theory and research have documented 3 such strategies: bolstering personal agency, affiliating with external systems perceived to be acting on the self's behalf, and affirming clear contingencies between actions and outcomes within the context of reduced control (here termed *specific structure*). We propose a 4th strategy: affirming nonspecific structure, or seeking out and preferring simple, clear, and consistent interpretations of the social and physical environments. Formulating this claim suggests that people will respond to reduced control by affirming structured interpretations that are unrelated to the control-reducing condition, and even those that entail otherwise adverse outcomes (e.g., pessimistic health prospects). Section 1 lays the conceptual foundation for our review, situating the proposed phenomenon in the literatures on control motivation and threat-compensation mechanisms. Section 2 reviews studies that have demonstrated that trait and state variations in perceived control predict a wide range of epistemic structuring tendencies, including pattern recognition and causal reasoning. We posit that these tendencies reflect a common desire for a structured understanding of one's environment. Accordingly, a new meta-analysis spanning the reviewed studies ($k = 55$) revealed that control reduction predicts nonspecific structure affirmation with a moderate effect size ($r = .25$). Section 3 reviews research on individual differences and situational moderators of this effect. The discussion addresses the interplay of compensatory control strategies and practical implications.

Keywords: control motivation, structure, compensatory control theory, self-regulation

People are motivated to perceive themselves as having control in their daily lives. As a consequence, they normally respond to events and cognitions that reduce personal control with efforts to restore perceived control to baseline levels. What psychological strategies do people use to compensate for low and reduced perceived control? Traditional theoretical perspectives focus on people's tendency to bolster personal agency, or to view themselves as capable of obtaining desired outcomes and achieving goals. These perspectives also recognize that people shore up confidence that particular actions will produce expected outcomes in a given

domain of experience. Other, more contemporary, lines of research have shown that people compensate by viewing powerful external systems (e.g., deities) as intervening or collectively operating to control outcomes on their personal behalf.

Complementing these insights, we propose that another common compensatory strategy is to affirm nonspecific epistemic structure—that is, to sustain interpretations of one's social and physical environments as simple (vs. complex), clear (discernable; not hidden or obscure, vague or ambiguous), and consistent (stable as opposed to erratic; marked by a coherent relation of parts vs. disordered). To elaborate, maintaining personal control requires more than knowledge about contingencies between actions and outcomes within particular domains, such as academics or finance. It also requires a domain-general conception of the world as structured in such a way that any willful action has a reliable chance of success. This idea can be used to reveal patterns in social cognition and behavior that have yet to be formally acknowledged in the control motivation literature. It suggests that people will compensate for reduced control by projecting structure on the world, even when no objective structure exists. It also suggests that control reduction will increase affirmation of structured interpretations that do not bear in any straightforward way on the control-reducing condition. In fact, control reduction may increase people's attraction to structured interpretations that they would otherwise find aversive.

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These effects have been demonstrated in numerous studies. Chronically low and situationally reduced control predict a range of structure-seeking tendencies, including visual pattern recognition, causal reasoning, and support for order-providing sociopolitical institutions. Considered as a whole, this body of research has highlighted previously unrecognized consequences of control motivation for social cognition and behavior—consequences that do not obviously follow from, and in some cases diverge from, mainstream theoretical perspectives. More generally, this work has illuminated the motives behind people's ordinary efforts to make meaningful sense of the social and physical world. The current article is the first to bring together these diverse, sometimes counterintuitive findings and articulate the phenomena that emerge from them.

Overview

The article is organized into four major sections. Section 1 provides the conceptual foundation for our presentation. The first half describes a new framework that distills classic and contemporary insights on the strategies that people use to compensate for low or reduced personal control. We then articulate a distinct strategy—affirming nonspecific structure—and situate it in that framework to highlight how it fits within the broader psychology of control maintenance. In addition to the control literature, a key context for our contribution is the emerging research area known as the threat-compensation literature. This literature encompasses several theories positing that threatening cognitions about the self (e.g., mortality, uncertainty) instigate structuring tendencies that are superficially unrelated to the threat. In the latter half of Section 1, we describe how our analysis is broadly consistent with these perspectives, including compensatory control theory, yet goes substantially further.

In essence, the two parts of Section 1 complement each other by defining the parameters of both “ends” of the proposed phenomenon: On the outcome end, nonspecific structure affirmation represents a unique compensatory control strategy; on the predictor end, compensatory control motivation is related to but distinct from other mechanisms posited to underlie threat-induced structure affirmation.

In Section 2, we shift from theory to evidence and review studies that have demonstrated the effect of control reduction on nonspecific structure affirmation. The processes examined in these studies are heterogeneous, spanning sensory perceptions, judgments, and decision making. Hence, they may not appear to constitute a unitary phenomenon. Yet we claim that they are motivated by an underlying desire to establish a structured understanding of reality. We buttress this claim conceptually by highlighting how each process represents a means to simplify, clarify, and consistently order one's environment, and thereby conforms to our definition of nonspecific structure. We also assess this claim quantitatively by presenting a new meta-analysis that tests the overall effect size of the reviewed studies.

Section 3 explores boundary conditions by reviewing studies that have shown that compensatory structure affirmation is moderated by individual differences (e.g., trait faith in benevolent agency) and situational variables (e.g., the salient portrayal of a given knowledge source). To organize these findings and guide

future research, we categorize them around moderating factors that have been validated in prior threat-compensation research.

A final Discussion section addresses theoretical implications and practical implications. We consider how the four compensatory control strategies articulated in Section 1 interact, what factors influence choice of strategy, and the consequences of compensatory structure affirmation for personal and collective well-being.

Section 1: Conceptual Foundation

Theoretical Background: Compensatory Control Strategies

Influential perspectives on control motivation in clinical and social psychology offer a number of terms and concepts to describe people's perceived capacity to control the environment, including self-efficacy (Bandura, 1977), mastery orientation (Dweck & Leggett, 1988), and personal strivings (Emmons, 1986). Despite important differences between these constructs, they converge with our current working definition of perceived control as the person's belief that he or she is capable of obtaining desired outcomes, avoiding undesired outcomes, and achieving goals (Ajzen, 1985; Burger, 1985; Langer, 1983; S. C. Thompson, 1991). As we noted above, people are motivated to maintain a consistent level of perceived control. High levels of perceived control are positively associated with better adjustment (e.g., fewer reports of psychopathology, higher self-esteem) and health practices (e.g., less alcohol abuse) as well as improved relationships, interpersonal skills, and emotional functioning. Conversely, social experiences and environmental conditions that create barriers to performance, frustrate goal pursuits, or otherwise threaten to diminish perceived control usually elicit negative arousal (Kobasa, 1979; Korchin, 1976; Tangney, Baumeister, & Boone, 2004; Taylor, 1983; S. C. Thompson, 1991).

Although people desire to be in control, they commonly confront circumstances and information that can diminish perceived control. Understanding how people cope with such conditions is necessary for understanding social behavior and psychological functioning on the whole. To that end, we describe three compensatory strategies examined in prior theory and research. Then, we propose that this picture can be enriched by recognizing that the affirmation of nonspecific epistemic structure represents a unique compensatory strategy—one that carries significant consequences for perception, judgment, and decision making. Figure 1 depicts the full framework of compensatory control strategies advanced in this article.

Personal and external agency. Traditional theoretical accounts hold that personal control derives primarily from personal agency: beliefs that one possesses the resources necessary to perform a behavior or set of behaviors required to produce certain outcomes or achieve certain ends. These resources include skills, knowledge, and other capabilities that enable the self to initiate action, expend effort in the pursuit of goals, and persist in the face of adversity. Consequently, when people confront circumstances or entertain thoughts that reduce their perceived control, they will restore control to baseline levels by strengthening (or artificially bolstering) their personal stock of resources and the likelihood that, through their own agency, they will successfully navigate

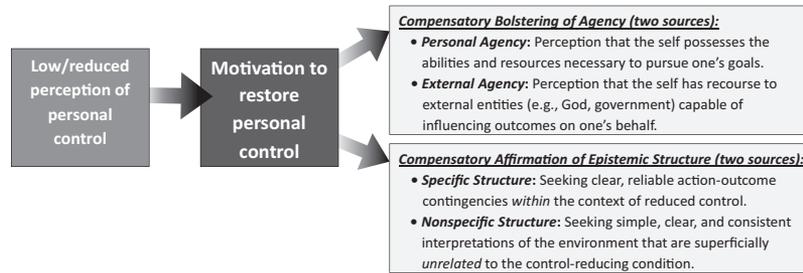


Figure 1. A framework of compensatory control strategies.

their environment. Indeed, people often hold illusory beliefs about their power to control random events (Langer, 1975).

Yet one need not rely exclusively on the self. Another compensatory strategy is bolstering external agency (also called *secondary control*), which involves relying on a system outside of the self as a locus of resources that can influence personally relevant outcomes and improve one's chances for achieving certain ends. The person employing this strategy renounces autonomous control over her life and yields agency to an external system that determines which outcomes are in her best interest and mobilizes the resources necessary to obtain those outcomes.

This insight has a long history in psychology (Rothbaum, Weisz, & Snyder, 1982). Theorists have postulated that people suppress awareness of their own impotence by investing faith in the beneficent intervention of a deity (Freud, 1927/1961) or the government (Adorno, Frenkel-Bunswick, Levinson, & Sanford, 1950). But only recently has experimental research shown that situational reduction in perceived control heightens people's investment in powerful external agents. In one such study (Kay, Gaucher, Napier, Callan, & Laurin, 2008), participants reported increased belief in God if they had previously recalled an event in which they lacked control, even though the recalled event was positive in valence. Indeed, this effect held when God was portrayed as intervening in one's daily affairs, but not when God was portrayed in more abstract terms as a cosmic creator, suggesting that control reduction specifically increased the appeal of God's benevolent agency.

Control reduction similarly heightens investment in secular systems, such as the sociopolitical institutions responsible for economic regulation and law enforcement, particularly when those systems are perceived to be acting in one's best interest. For example, Kay et al. (2008) showed that participants reminded of a control-reducing (yet positive) event subsequently ascribed more power to their government, particularly if they were predisposed to perceive the government to be benevolent and efficacious or if they lived under governments objectively ranked as relatively noncorrupt. In similar studies, low and temporarily reduced control predicted identification with and conformity to social groups, which typically yield more power than the self in isolation (Fritsche et al., 2013).

Epistemic structure. Agency is necessary to maintain perceived control, but it is not sufficient. People also need to feel confident that the environment is structured in such a way that performing particular actions reliably produces expected outcomes (Lewin, 1938; Mitchell, 1974)—what the self-efficacy literature labels *outcome expectancies* (Bandura, 1984, 1986). Put another

way, even the most prodigious powers to perform a particular action would be ineffectual if no reliable contingency was believed to exist between that action and an expected outcome. Supporting evidence has shown that outcome expectancies predict goal-relevant intentions and behavior independent of personal efficacy beliefs (Maddux, Norton, & Stoltenberg, 1986; Wilson, Wallston, & King, 1990). For example, students study hard only if they believe there is a reliable link between studying and the final grade they receive (Shell, Murphy, & Bruning, 1989).

It is crucial to note that, in this line of theory and research, knowledge about action–outcome contingencies has been defined, operationalized, and measured in the context of actions and outcomes within a specific domain of experience, such as academic achievement and smoking cessation. Hence, we label this source of personal control *specific* epistemic structure.

A complementary insight, and the starting point for our current contribution, comes from existentially oriented theorists, including Rollo May (1953), Erich Fromm (1941/1994), and Ernest Becker (1964, 1969), who explored the deep-seated motives that drive people to imbue the world with meaning. They proposed that a sense of personal control is firmly rooted in the knowledge that the world has a clear and stable structure or order. On this view, a broad network of beliefs about the nature of reality—beliefs that are usually taken for granted—provides the epistemic infrastructure necessary for any attempt, in any given domain, to pursue goals, to obtain desired outcomes, and generally to view the self as in control.

To elaborate this idea, the person can reliably control an environment wherein people and other stimuli are capable of being identified and bounded off from one another, objects have recognizable form and stable properties, and concepts are organized (e.g., social roles fit into hierarchies). Conversely, a world of ill-defined stimuli that relate to each other in shifting or ambiguous ways affords the person few reliable opportunities to exert control.

A closely related idea is that personal control depends on the belief that favorable and unfavorable outcomes have clear causes and do not occur on an arbitrary or random basis. If people perceived that their well-being and existence could be affected by myriad accidental and unpredictable factors in the environment, then they could not be sure of their powers to reliably control that environment. This point is echoed in the seminal work of Melvin Lerner (1980), who proposed that sustaining confident goal-directed action in any domain rests on a global worldview in which events occur as expected.

Distilling these ideas, we propose that a common strategy people use to compensate for low or reduced control is to affirm

nonspecific epistemic structure—to seek and prefer simple, clear, and consistent interpretations of the world. This strategy is distinct from bolstering personal agency, because it does not directly target beliefs about one’s own resources or willpower. It is distinct from bolstering external agency because it does not directly target beliefs about external systems acting in one’s best interests or sharing in a collective control effort with a common goal. And it is distinct from affirming specific epistemic structure, because it targets aspects of the social and physical environments that lie outside the domain of the control-reducing condition.

To illustrate these distinctions, imagine that Bob has recently taken a new job and is on his way to the company’s first informal social event. Bob’s confidence that he can control this situation rests partly on personal agency: believing that he possesses the resources (e.g., professionalism, wit) necessary to make a positive impression on his coworkers. It also rests partly on specific epistemic structure. He needs to believe that, within the domain of socializing, performing particular behaviors (e.g., telling jokes) will reliably produce particular outcomes (e.g., approval from his new colleagues). He may also solicit a deity to extend the shield of its benevolent protection over him.

Underscoring the motive for nonspecific epistemic structure adds another critical piece to this picture. Bob’s sense of personal control rests on his belief (typically unconscious) that the world is a structured place. Bob needs to interpret his environment as one in which other people’s characteristics and behaviors are fairly consistent from one moment to the next, events predictably cause other events, a chair will be recognizable as such, and so on. Conversely, if Bob interpreted his environment as lacking in structure—if he perceived, for example, that events occurred haphazardly—he would have difficulty maintaining perceived control.

By proposing that nonspecific structure affirmation is a distinct compensatory control strategy, we can predict phenomena that would not be expected on the basis of prior theory and research: (a) Under conditions of reduced control, people will seek and prefer structured interpretations of the environment even when those interpretations do not bear in any straightforward way on the control-reducing condition; (b) people will compensate for reduced personal control by affirming structured interpretations that are independent of their agency beliefs and their perceived likelihood of obtaining specific outcomes; (c) related to (b) and less intuitively, control reduction will heighten people’s preference for structured interpretations that are otherwise contrary to their interests and welfare. That is, people may embrace structure at the cost of viewing themselves as, for example, low in social status, destined to suffer from disease, or victimized by malevolent forces. This further distinguishes nonspecific structure affirmation from bolstering of external agency, because the latter involves control restoration by means of faith in *benevolent* systems acting on one’s behalf or promoting one’s goals.

These phenomena have been observed in numerous empirical studies that have used a range of methodological approaches (e.g., laboratory-based experiments, correlational studies, archival studies). Although some relevant studies date back decades, most are recent owing to the emergence of compensatory control theory (CCT; Kay et al., 2008), which we will discuss shortly. Our review in Section 2 will cover studies examining the effects of chronically low and situationally reduced personal control on several percep-

tual and behavioral tendencies to identify patterns, to avoid chaos, and generally to establish structured interpretations of the world.

Social psychologists have long sought to explain these tendencies toward epistemic structure, and they have traditionally attributed them to people’s ingrained passivity in the face of informational complexity and ambiguity (S. T. Fiske & Taylor, 1991; Hamilton, 2005; Kunda, 1999; Moskowitz, 2005). Cognitive laziness may be only part of the picture, however. We aim to show that a potent motive for nonspecific epistemic structure is the satisfaction of a deep-seated need for personal control.

Empirical Background: Motivated Structure Seeking

A major advance in social psychology over the past 30 years is the development of several related theories known collectively as the *threat compensation* literature. These theories each, in their own way, explain how people’s quest for meaning is fueled and directed by their attempts to come to terms with threatening existential realities. Inspired by these theories, researchers have devised empirical paradigms for experimentally testing the effect of salient psychological threats on the appeal of nonspecific epistemic structure. A selective survey of this work sets the context for our review in Section 2.

Compensatory control theory. CCT (Kay et al., 2008; Kay, Whitson, Gaucher, & Galinsky, 2009) proposes that people embrace ideologies that emphasize personal, societal, or religious control to alleviate anxieties they experience when they perceive randomness and disorder in their lives. On this account, the need to perceive the world as controllable, nonrandom, and orderly is a latent motivation that is often satiated by social and political ideologies that confer control despite differing in content. Consistent with this theoretical emphasis, research inspired by CCT has thus far focused on the common theme of control in otherwise distinct religious and political ideologies.

CCT was inspired by several different theories, including system justification theory (Jost & Banaji, 1994), just-world theory (M. J. Lerner, 1980), and the dual-process model of control (Rothbaum et al., 1982). Most directly, though, it emerged from two (seemingly contradictory) waves of research in social, clinical, and personality psychology. The first wave, summarized in our Theoretical Background section, strongly argued for the existence of a fundamental need for people to believe they personally control what happens to them, and also sought to demonstrate that believing otherwise is psychologically aversive and linked to dysfunctional outcomes (e.g., Janoff-Bulman, 1992). Why would people be so driven to believe in personal control? One answer is that control is appealing, in large part, because it logically implies an orderly world, one in which everything has a determinable cause (M. J. Lerner, 1980) and events follow clear rules of cause and effect (Kay et al., 2008).

Complicating these findings, however, is a second wave of research that has demonstrated that perceptions of personal control are more varied than originally assumed. Beliefs in personal control, the motivation to maintain them, and even their consequences for healthy functioning vary across individuals, cultural contexts, socioeconomic status, and social contexts (e.g., Burger, 1989; Ji, Peng, & Nisbett, 2000; Snibbe & Markus, 2005). Given that the need to perceive an orderly, nonrandom world is presumed to be

fundamental and constant, how do people fulfill this need when their belief in personal control is low?

According to CCT, when personal control is low or reduced, an alternative means for maintaining order is the endorsement of culturally available external sources of secular or religious control. Believing in the power of social institutions or supernatural agents can provide individuals with the security of knowing that, though they may not personally control all that happens, whatever does occur will not be random and there are powerful forces that ensure a stable causal order (Antonovsky, 1979; Rothbaum et al., 1982). Thus, with respect to fulfilling the overarching motive to believe in an orderly world, CCT posits that people can and do substitute cognitions about the self and cognitions about external agents of control. In this way, the theory suggests that people can compensate for reduced personal control by more fervently believing in the existence and influence of controlling external entities.

This proposition, especially when combined with recent functional, cognitive perspectives on the operation of ideology (Kay & Eibach, 2013), has proven useful at furthering our understanding of the roots, content, and strength of people's ideological attachments. Indeed, there are now several sources of evidence supporting the basic tenets of CCT and testing its implications for socio-political and religious ideologies, ranging from belief in God to system justification (Jost & Banaji, 1994). Relevant studies have shown that experimentally reduced personal control heightens people's beliefs in a controlling God (Kay et al., 2008; Kay, Moscovitch, & Laurin, 2010; Laurin, Kay, & Moscovitch, 2008), their preferences for government control, and their support for current government structure and policies (Kay et al., 2008). The reverse also holds true: Participants led to believe that their government (i.e., an external source of control) was unable to assure order demonstrated increased illusions of personal control (Kay et al., 2008). Other relevant studies have used various methods to demonstrate the role of emotion, anxiety, and defensiveness in mediating compensatory control phenomena (e.g., Kay et al., 2008; Kay, Moscovitch, & Laurin, 2010; Laurin et al., 2008).

Supporting the fully hydraulic predictions of CCT, research has shown that: Naturally occurring events that threaten the perceived stability of governments (e.g., upcoming elections) increase belief in religious sources of control; experimental manipulations that threaten belief in God's control increase belief in government control and support for extant government policy; and experimental manipulations that affirm the ability of the government to provide order lessen belief in religious sources of control (Kay, Shepherd, Blatz, Chua, & Galinsky, 2010).

Related studies have established the discriminant validity of these effects. Following threats that suggest disorder, people specifically affirm worldviews that emphasize personal or external sources of control. For example, whereas threats to personal control increase belief in a controlling God, this effect disappears when God's control is not emphasized in the dependent measure (Kay et al., 2008). Similarly, specific effects have been observed in the context of political beliefs (Kay, Shepherd, et al., 2010; Shepherd, Kay, Landau, & Keefer, 2011). In each case, control reduction increased endorsement of the order-conferring aspects of the relevant construct or ideology (e.g., the parts of the government that establish and maintain law and order), but did not affect attributes tied more directly to other needs, such as symbolic immortality, individuality, group identity, or personal significance.

Finally, most CCT studies have lowered personal control through manipulations that ask participants to consider uncontrollable, but *positive*, events that have recently occurred to them (e.g., "good breaks"). By demonstrating compensatory control effects in the context of this type of positively valenced manipulation, these studies have distinguished compensatory control from simple negativity compensation (Kay et al., 2008).

In summary, CCT posits a motivated substitutability between personal control and secular and religious sources of external control, and considerable evidence now supports the hypothesized substitutability of these belief systems and their function in defending against perceived randomness. It is important to note, though, that because CCT originated from attempts to explain people's generally high levels of support for governmental and religious sources of control, it has yet to be applied to organize the various lines of research that have shown a relation between control motivation and basic epistemic structuring tendencies, nor has the theory been directly applied to explain why this relation might exist. The current analysis and review fill this gap, thereby extending CCT to explain a much broader range of social psychological phenomena.

Terror management theory. Terror management theory (TMT) posits that people desire continued life yet realize that their death is always potentially imminent and ultimately inevitable. This awareness poses an ever-present potential for anxiety. People normally ameliorate death-related anxiety by investing in two constructs that operate in concert to deny that death represents the absolute end of one's existence. The first construct is a cultural worldview: a widely shared conception of reality that imbues life with meaning and the possibility of death transcendence (literal or symbolic) for individuals who fulfill cultural prescriptions for valued conduct. The second construct is self-esteem: an evaluation of oneself as meeting internalized cultural standards of value and, consequently, qualifying for the routes to death transcendence promised by the worldview to which one subscribes.

Initially, research inspired by TMT focused on testing the effect of death reminders, or mortality salience as it is called, on people's investment in specific aspects of their cultural worldview, such as their religious beliefs and political ideology (see Greenberg, Solomon, & Arndt, 2008, for a review). A later wave of research showed that mortality salience increased the appeal of nonspecific epistemic structure. For example, it led people to seek simple and consistent interpretations of other people's behavior (Landau et al., 2004) and view social events as following a just and benevolent order (Hirschberger, 2006).

The current perspective shares with TMT the idea that a structured conception of reality protects the individual from threatening cognitions. One way to compare the perspectives is to debate which is the ultimate or "core" source of people's unease: Is compensatory control simply one means of mitigating mortality concerns, or is mortality threatening simply because it is uncontrollable? This ground has been thoroughly covered elsewhere (Fritsche, Jonas, & Fankhänel, 2008; Proulx, 2012) and will not be retread here.

Instead, we offer a comparison of the theories' accounts of what people want. For TMT, people want to meet cultural standards of value by which their life can be perceived as significant and enduring beyond death—to maintain the global perception that "I am a person of worth and I am doing something good; and one day

‘I’ll do something great that will be remembered.’ On this account, maintaining nonspecific structure serves ultimately to support self-esteem. Most efforts to attain self-esteem—whether they involve upholding religious dictates or achieving fame and fortune—depend on the perception that the social and physical environments have a stable structure that affords reliable routes to culturally valued action. If this structure were lacking (e.g., if other people acted inconsistently), then people would lack the epistemic infrastructure necessary to confidently establish a sense of enduring personal value. As a result, they would be vulnerable to the threatening prospect of perishing entirely.

We contend that before the person becomes cognizant of his or her mortality during the normal course of development, she or he is motivated to navigate and manipulate the environment to pursue desired outcomes and avoid undesired outcomes. We acknowledge that control motivation assumes a new expression with the advent of mortality awareness. From that point on, the person wants to do (or at least perceive that she is doing) whatever qualifies her as a significant contributor to the world. Nevertheless, as Pyszczynski et al. (2015) have argued compellingly, this manifestation does not overwrite the original control motivation. Instead, people continue to pursue proximal goals and, consequently, they desire structure over complexity, ambiguity, and randomness.

With this theoretical reconciliation, we acknowledge that mortality salience and control reduction can both instigate nonspecific structure affirmation without attempting to reduce one effect to the other. This enables us to formulate hypotheses that would not follow from such a reduction. Foremost, it suggests that people will compensate for reduced control by affirming structured interpretations that do not necessarily enhance their self-esteem. Indeed, control reduction should increase the appeal of structured interpretations even when they threaten to undermine self-esteem, such as by lowering the self’s position in the social hierarchy. As we shall see, this hypothesis has been confirmed in numerous studies.

Meaning maintenance model, behavioral inhibition, and a common biological mechanism. The meaning maintenance model (MMM; Heine, Proulx, & Vohs, 2006) posits that any violation of a meaning framework—defined as a previously expected and established set of relations or associations, or what Proulx and Inzlicht (2012) succinctly refer to as the *familiar*—will lead to psychological compensation. The MMM, successively refined in a number of articles (Proulx & Inzlicht, 2012), has proven very useful in demonstrating common aspects of several different threat and compensation processes. Research inspired by the model has also begun to uncover, describe, and organize the neurobiological processes implicated in any instance in which an individual is confronted with a goal-relevant existential or epistemic threat.

This line of research has produced provocative explanations of the process-based and biological systems that afford continued goal pursuit in the face of a host of psychological threats. Proulx, Inzlicht, and Harmon-Jones (2012), for example, have offered a compelling case that one commonality to any instance of psychological threat sufficient to induce compensation is that, at some point following exposure, the threat will manifest as a form of bottlenecked aversive arousal. It is this “common syndrome of aversive arousal” (Proulx et al., 2012, p. 288), the authors have suggested, that fuels compensatory cognition across the range of

threat and compensation phenomena that proliferate the social, clinical, and personality psychology literatures.

Taking these ideas one step further, Jonas et al. (2014) integrated an even broader array of literatures with the goal of presenting a more complete description of the sequence of biological and neurological processes triggered by expectancy violations. Jonas et al. thoroughly lay out the specifics of this model, so we will touch on only the most relevant aspects. When individuals encounter motivationally relevant psychological discrepancies, basic neural processes related to anxiety become activated. In particular, the behavioral inhibition system (Gray & McNaughton, 2000) triggers a host of responses following exposure to threats or discrepancies, which include hypervigilance and anxious arousal, with the ultimate goal of helping people to cope with the discrepancy and ultimately resume goal-directed action. This type of response is considered proximal (as opposed to distal) and manifests in efforts to reduce, inhibit, or avoid the immediate threat by means of dilated focus and attention, both away from the threat and toward something more helpful in goal resumption.

Simultaneously, people become more attuned to the anxiety and oriented toward an immediate search for new information or means of reducing the anxiety. Because behavioral inhibition anxiety impedes confident action, once it is reduced by means of compensation, the individual should be able to resume goal pursuit. If immediate, proximal courses of action to cope with the anxiety are not available—because, for example, the threat simply cannot be overcome, people are unaware of its source, or it is persistent—people may instead shift to more distal, indirect modes of compensation that are palliative and do not address the salient threat in a direct fashion but serve to mute anxiety more generally.

We believe the effects reviewed in Section 2 are broadly consistent with the process-based accounts just described. For example, past research has observed associations between control reduction and neural and physiological indicators of anxiety and vigilance (e.g., Crombez, Eccleston, De Vlieger, Van Damme, & De Clercq, 2008; Laurin et al., 2008), suggesting there is good reason to expect control reduction to engender the type of aversive arousal posited to bottleneck following any instance of expectancy violation (Proulx & Inzlicht, 2012). To the extent this is so, when control is lowered or otherwise diminished, proximal threat reduction responses should also follow (Jonas et al., 2014). Indeed, many of the compensatory control findings we will review demonstrate people’s efforts to simplify complicated and confusing scenarios into something that is easier to focus on and comprehend. These efforts include, for example, detecting visual patterns and reducing other people to a few concrete attributes. Throughout this article, we point out this perspective’s explanatory utility.

But what is the range of proximal responses we might expect following control reduction? And what does it mean to directly compensate for control-related expectancy violations? Although models that focus on common biological and neurological mechanisms offer a useful framework for conceptualizing causal relations between classes of experiences and classes of compensatory reactions, they explicitly defer to other, more specific frameworks, like the one offered here, to articulate how particular types of beliefs may scaffold on one another to serve particular ends (Jonas et al., 2014; Proulx & Inzlicht, 2012). That is, the relation between a given belief and a goal in the proximal phase of coping may not be delineated by Jonas et al.’s broad, metatheoretical model.

Therefore, it is important to complement this model with theories that can explain these relations at a more local level of analysis, and thereby guide the formulation of testable hypotheses (Huang & Bargh, 2014). In the case of control motives, for decades the prevailing view in psychological science has held that people compensate for reduced control by either bolstering personal agency or appealing to external sources of benevolent power (see Kay, Sullivan, & Landau, 2015, for a review). Yet, as we will see shortly, this prevailing view is incomplete.

Section 2: Effects of Control Reduction on Nonspecific Structure Affirmation

On the basis of our claim that maintaining perceived control rests, in part, on construing the world as a structured place, we expect people to compensate for reduced control by affirming nonspecific epistemic structure. Supporting this claim, numerous studies have shown that chronically low and situationally reduced personal control predict diverse tendencies to seek and prefer simple, clear, and consistent interpretations of the social and physical environments. In reviewing this literature, we begin with studies that have shown that control reduction increases affirmation of structured interpretations that are unrelated to the control-reducing event or cognition. Then, beginning with the subsection Conspiracy Theories, we review studies that have shown that control reduction increases affirmation of structured interpretations that entail otherwise adverse outcomes.

Pattern Recognition

Gestalt psychologists demonstrated that the human visual system employs multiple processes to project coherence on the stimulus field (Kohler, 1972; Wertheimer, 1923). One such process is connecting spatially proximal stimuli in larger patterns. For example, observers presented with visual noise—an image of randomly distributed black and white splotches—and asked whether they perceived the letter *S* or a smiley face, felt certain that they did (Gosselin & Schyns, 2003). Other perceptual processes are similarly geared to recognize patterns: If six notes are played on a flute, with a pause between the third and fourth notes, listeners hear them as two triads of notes (Wertheimer, 1923).

This tendency to perceive (and regard as objective) patterns may support perceived control, even when those patterns are unrelated to current goals. An environment with patterns is one that can be reliably negotiated, whereas an environment that presents a shifting, ambiguous mass of unrecognizable forms affords few reliable opportunities for controlling outcomes. This reasoning leads us to expect that control reduction will increase people's tendency to perceive visual patterns, even when none objectively exist. Although some field studies have hinted at this possibility (Simonov, Frolov, Evtushenko, & Sviridov, 1977), strong experimental evidence has only recently emerged.

Specifically, studies by Whitson and Galinsky (2008) showed that participants randomly assigned to contemplate control-reducing experiences displayed, in an ostensibly unrelated task, a heightened tendency to perceive various illusory patterns (e.g., mountains, a dog) in visual noise. In a follow-up study, participants recalled a distressing situation in which they either had control or lacked control. Although all participants contemplated

adverse, anxiety-provoking conditions, only those who felt they lacked control perceived more illusory patterns. This suggests that the observed effect was due specifically to reduced perceived control, not the mere salience of adverse conditions (also see Laurin et al., 2008).

Preference for Definite Boundaries

People also create structure by perceiving clear boundaries that define stimuli and distinguish them from one another (Burris & Branscombe, 2005). If people lacked the perception of boundaries in the environment, they would find it difficult to know where one stimulus ends and the next begins. Our guiding analysis suggests that control reduction will increase people's attraction to clearly bounded aspects of their environment.

Cutright (2012) has demonstrated this phenomenon across a series of diverse and clever paradigms. In one study, some participants were able to control the noise level in the laboratory while others were not—a control reduction manipulation used in many prior studies (e.g., Glass, Singer, & Friedman, 1969; Pennebaker, Burnam, Schaeffer, & Harper, 1977). Afterward, they were given the choice between two postcards (ostensibly a participation gift). The postcards depicted the same water lily garden, but one had a black border around the picture whereas the other did not. Participants who were previously deprived of control were nearly 2.5 times more likely to choose the bounded postcard than their in-control counterparts.

Follow-up studies showed that: Control reduction increases preferences for product logos that are bounded versus unbounded; this effect is not due to the general negativity of the control-reducing cognitions; and, supporting the mechanistic, proximal compensation account offered by Jonas et al. (2014), this effect is driven by feelings of attentional overload and the need for narrowed attention. Moreover, extensive pretesting revealed no initial aesthetic preference between the two postcards. This means that control reduction did not simply lead people to more zealously express their preexisting preferences; rather, it led them specifically to prefer clear boundaries in the environment.

Aside from physical, aesthetic boundaries, structure is afforded by tight mental boundaries that dictate where things belong on the basis of their traits, attributes, and other associations. When people seek structure in the world, they prefer to interpret things as contained within their designated space, and therefore respond negatively to stimuli that violate those mental boundaries. Cutright, Bettman, and Fitzsimons (2013) examined how these processes influenced attitudes toward brand extensions. Brands are categories that communicate a bounded set of product or service features, benefits, and other associations. When brands extend in new areas (e.g., when Starbucks coffeehouse announced it would extend its offerings to include beer and wine), it can stretch the brand beyond its accepted boundaries and introduce complexity. Cutright et al. (2013) reasoned that when control is reduced, people will have an enhanced desire for structure. They therefore will form tighter mental boundaries around what a brand represents and where it belongs. Accordingly, control reduction led participants to report negative overall evaluations of brand extensions that were clearly inconsistent with the brand (e.g., automobile manufacturer Honda opening a line of vacation resorts). In contrast, and as predicted, control reduction did not decrease liking

for extensions that were within the brand's accepted boundaries (e.g., Honda extending to go-kart racing centers).

Preference for Order Providing Scientific Theories

Because science is often popularly portrayed as a trusted means of gaining definite knowledge about the world, it would seem to be an attractive source of structure (some evidence has supported this possibility; e.g., athletes reported greater belief in science when about to compete vs. when in training; Farias, Newheiser, Kahane, & de Toledo, 2013). However, people do not always regard scientific theories as affording order and predictability. For example, a sizable portion of the population is skeptical of, and in some cases openly hostile toward, Darwin's theory of evolution by natural selection, preferring traditional religious accounts of the origin of life in general and of modern humans in particular.

Although this widespread resistance baffles many educators and citizens, it makes sense when considering the two accounts' structure affordances. Whereas most religious accounts, such as biblical Creationism, offer a clear, directive force in the creation of humankind, the theory of evolution by natural selection explicitly acknowledges the role of *random* mutations in shaping human nature. Might people's relative preference for Creationism over evolutionary theory be another means of structuring the world to compensate for reduced personal control?

To find out, Rutjens, van der Pligt, and van Harreveld (2010) first manipulated participants' perceived control (by means of a memory task) and then presented them with a pair of theories about the origin of life. All participants read about Intelligent Design theory, described as positing that "the way our world and the universe work can be best explained as the result of the efforts of a higher power." Half the participants also read about evolution by natural selection, described as a generally "unstructured and random process in which unpredictable features of the natural environment determine how life evolves." The other half read about Conway Morris's version of evolutionary theory, which posits that "if evolution would be replayed, results would inevitably be similar to the present state of affairs. Evolution follows certain paths and is therefore best described as a mechanism that is bound to have specific structural characteristics."

As Rutjens et al. (2010) predicted, when the theory of evolution was described using Darwin's language of random mutations, control reduction led to a marked preference for Intelligent Design. But when evolution was described using Conway Morris's more structured account, the effect of control reduction on preference for the religious account over the scientific account disappeared entirely. These findings are unlikely to be due to compensatory affirmation of external agency or simply adherence to preexisting beliefs: The presentation of Conway Morris's account did not feature a benevolent agent; rather, it afforded more structure than parallel accounts that acknowledge random mutation.

Related studies have demonstrated the role of compensatory control in people's preference for certain types of scientific theories. Consider that many developmental and biopsychological theories posit stages that are clearly delineated from one another and occur in a fixed sequence. Such stage theories originate in the groundbreaking work of Freud, Piaget, and Kohlberg, and although they have been criticized as simplistic (e.g., Lourenço & Machado, 1996), they continue to represent some of the most

influential theories in psychology and the social and behavioral sciences more generally.

By positing clear categories and fixed sequences, stage theories afford a more structured account of human development than equivalent theories positing continuous processes (R. M. Lerner, 2002). Thus, stage theories may satisfy people's need for control, independent of their utility in guiding scientific inquiry. Supporting this possibility, Rutjens, van Harreveld, van der Pligt, Kreemers, and Noordewier (2013) found that participants responded to reduced control with an increased preference for stage theories over parallel continuous theories of grief, moral development, and Alzheimer disease. What's more, these effects were mediated by a general heightened search for structure on the part of the control-threatened participants (as operationalized by the detection of patterns in the snowy-picture task).

Metaphysical Beliefs

Pseudoscientific belief systems, much like their scientifically respectable counterparts, may also gain their appeal by providing structure. Consider astrology and the common practice of consulting horoscopes, which offer the belief that central aspects of one's life, such as financial and romantic outcomes, are governed not by randomness but by the clockwork motions of the planets and stars (Hartmann, Reuter, & Nyborg, 2006; Tester, 1987).

Correlational research has pointed to an increased belief in astrology during times when personal control is likely to be reduced. For example, adults taking an elective astrology class had experienced more recent personal crises (e.g., unemployment or divorce) than a similar group of adults taking nonastrology classes (Lillqvist & Lindeman, 1998). Furthermore, individuals in the nonastrology classes who had (vs. had not) recently experienced personal crises reported a stronger interest in astrology. Related correlational and archival research has shown that times of political or economic upset, such as the Great Depression, are associated with an uptick in the publication and sale of astrology literature and beliefs in cosmic determinism (Padgett & Jorgenson, 1982; Sales, 1972).

Experimental studies by Wang, Whitson, and Menon (2012) have provided stronger evidence for the causal impact of control reduction on astrology beliefs. In one study, participants under conditions of reduced control were more likely than participants in comparison conditions to rate themselves as possessing characteristics a horoscope described them as possessing, despite the fact that, unknown to the participants, the horoscopes were chosen at random and therefore pertained to their personalities only contingently.

Low and reduced control predict increased investment in other pseudoscientific beliefs that afford a structured view of reality. In one set of studies, Greenaway, Louis, and Hornsey (2013) found that control-reduced participants strongly endorsed the belief that people—themselves and others—are capable of precognition, or presaging outcomes before they occur. The researchers interpreted this finding as providing evidence that people compensate for reduced control by believing that events unfold according to a systematic, comprehensible scheme rather than myriad unknown and unknowable factors.

Preference for Hierarchy

Social hierarchy is a vertically stratified relationship between two or more people or groups in which those at higher levels of the hierarchy have greater power and status than those at lower levels (Magee & Galinsky, 2008). People have mixed attitudes toward hierarchy as a form of social organization. In countries such as the United States and Canada, hierarchy, compared with equality, is generally seen as *less* fair and less representative of social ideals (Bellah, Madsen, Sullivan, Swidler, & Epton, 1996; A. P. Fiske, 1994; Kluegel & Smith, 1986) but as *more* structured and organized (Friesen, Kay, Eibach, & Galinsky, 2014).

Based on our guiding analysis, we would expect people to respond to reduced control with stronger preference for hierarchy as a form of social organization, despite the fact that they do not necessarily endorse hierarchy as a fair social organization. Accordingly, Friesen, Kay, et al. (2014) found that control reduction led participants to: perceive more hierarchy occurring in ambiguous social situations; endorse hierarchy to a greater degree; prefer hierarchical organization within businesses and corporations; and prefer hierarchy-enhancing careers. Supporting the claim that hierarchy is appealing because it affords epistemic structure, participants led to believe that hierarchy is, despite appearances, a highly disordered social organization showed the opposite effect, responding to reduced control with decrease attraction to hierarchy.

Related findings reported by Goode, Keefer, and Molina (2014b) showed that control reduction heightened endorsement of a meritocratic social order within which success in society is a simple function of hard work and sacrifice, and is not dependent on contingencies such as chance encounters and group-based advantages. Together, these findings demonstrate that people compensate for reduced control by projecting simple structure on the sociopolitical environment.

Objectification, Object Attachment, and Anthropomorphization

Objectification is the tendency to think about and treat an individual more like an object or a commodity than a person. Prior theorizing has traced objectification to a number of causes, including the desire to view others as tools for one's own goal pursuit (Fredrickson & Roberts, 1997; Gruenfeld, Inesi, Magee, & Galinsky, 2008). Landau, Sullivan, Keefer, Rothschild, and Osman (2012) proposed a complementary account derived from theorizing on control motivation. On this account, people recognize (at least implicitly) that controlling other people requires that they understand and influence other people's subjective states, including their private beliefs and desires. Consequently, the belief that one has control over others can be reduced by the awareness that other people's subjective states are obscure, occasionally volatile, and often immune to one's influence. Objectification is a means of compensating for this felt ineptness. By reducing other people to simple, concrete attributes, such as their body parts and occupational roles, the person can feel more confident in her or his ability to manipulate and control them.

In one supporting study (Landau et al., 2012), men led to feel incompetent to influence women at a subjective level responded by perceiving women in general more in terms of isolated aspects of their physical appearance. A follow-up study focused on objecti-

fication in a hypothetical workplace scenario. Men and women led to doubt their ability to influence their coworkers' thoughts and feelings responded by reducing employees in general to their circumscribed occupational roles. In neither study did control reduction affect participants' global attitudes toward the target individuals, nor did global attitudes mediate control reduction's effect on objectification. This suggests that control reduction increased the tendency to represent other people in terms of concrete attributes, not to denigrate them.

It is unlikely that participants in these studies reduced others to concrete attributes to pursue a particular goal, as other accounts of objectification would emphasize; rather, they seem to be compensating for reduced control by focusing on structured aspects of their environment and diverting attention away from unstructured aspects.

Keefer, Landau, Rothschild, and Sullivan (2012) applied this analysis to explain people's occasional tendency to crave engagement with inanimate objects (e.g., technological gadgets) over flesh and blood people. Many objects have well-known properties that remain stable over time. Being clear and consistent aspects of one's environment, objects may help the person compensate for felt ineptness in influencing others' subjective states. Keefer et al. (2012) reported a series of studies supporting this claim. In one, participants led to doubt their ability to influence other people responded with increased attachment to their material belongings, regardless of the belongings' perceived importance for facilitating social relationships. Also, consistent with our current analysis, this effect was mediated by participants' feeling that they lacked control over their interpersonal relationships.

We have seen that one means of structuring interpretations of other people is to reduce them to objects. But what happens when we have difficulty predicting how a nonhuman entity behaves? Here one may derive structure through anthropomorphization—conceptualizing that entity in terms of familiar folk theories of how people think, feel, and act. Consistent with the current analysis, Epley, Waytz, and Cacioppo (2007) proposed that people are particularly prone to anthropomorphize in those situations when they face a threat to their motivation to control their environment. Accordingly, studies have shown that participants were more likely to perceive humanlike characteristics in various nonhuman objects (e.g., consumer gadgets, robots) that had been earlier portrayed as behaving in an unpredictable (vs. predictable) manner (Waytz et al., 2010).

Taken together, these lines of research have suggested that when people are motivated to restore personal control by means of affirming structure, it helps both to reduce other people to objects and to impute objects with humanlike characteristics that provide some familiar basis for understanding and predicting their behavior.

Conspiracy Theories

People may feel threatened by the fact that they are limited in their ability to anticipate and control the myriad diffuse and capricious hazards lurking in their environment, because it implies that their well-being and even existence are subject to unpredictable changes of fortune. Belief in conspiracy theories may be one means of transforming the threatening reality of chaotic hazards into something more understandable and controlled. Conspiracies

are “exaggerated perceptions . . . [that] entail the *overperception* of temporal and social linkages” (Kramer & Gavrieli, 2005, p. 255 [original emphasis]). In another theorist’s words, “conspiracy theory gives causes and motives to events that are more rationally seen as accidents. By attributing motives to chance happenings, believers gain control of the uncontrollable” (Pipes, 1997, p. 181). In short, conspiracy theories boil down the welter of information about the social world to the systematic machinations of a few malevolent agents. Even though people generally view conspiracies as negatively impacting their daily lives (Hofstadter, 1965; Zonis & Joseph, 1994), they may nevertheless embrace them in the wake of reduced control as a means to impose order on the world.

Supporting evidence has shown that conditions likely to reduce perceived control (e.g., induced sense of hearing loss without awareness of its source) are positively associated with conspiratorial perceptions (Zimbardo, Andersen, & Kabat, 1981). In a more direct test, Whitson and Galinsky (2008) found that participants who recalled a distressing situation in which they lacked (vs. possessed) control subsequently perceived a greater likelihood of conspiracy. That is, independent of contemplating globally adverse conditions, control reduction incited the conspiratorial imagination.

Enemyship

People often believe that individuals are systematically plotting their downfall and, furthermore, they tend to perceive these enemy figures as exceptionally intelligent, powerful, and resourceful. By one estimate, 70% of Americans have reported having had, at some point, a powerful enemy who sought to sabotage their goals and inflict harm (Holt, 1989). Although enemies can certainly exist and pose a legitimate threat to one’s well-being, people nevertheless seem almost irrationally motivated to single out powerful enemies in their environment.

On the surface, this tendency is puzzling. Why would people want to believe that powerful others aim to cause them harm? The current analysis suggests a provocative answer: The perception that one has enemies is undesirable, but it averts the more profoundly distressing realization that one has limited ability to control the myriad chaotic forces in the environment—from airborne bacteria to Zipcar accidents—that threaten to block one’s goals and undermine one’s well-being. Imbuing real or imagined enemies with undue power is a way of viewing multiple sources of potential hazard as stemming from the machinations of a focal individual or individuals (cf. Jonas et al., 2014), and not as spread diffusely throughout the environment.

As a strategy for compensating for low or reduced control, enemyship is similar to bolstering external agency because it involves transferring power to an agent other than the self. Yet it is clearly very different. In the case of enemyship, people transfer power to external agents not because those agents have benevolent intentions toward them or will help them achieve their goals—indeed, the opposite is true—but rather as a means of reducing the perceived role of random, unpredictable hazard and risk in determining life outcomes. Random hazards are stubbornly mysterious, whereas the scheming of one or a few adversaries is easy to grasp.

In a series of studies assessing this analysis, Sullivan, Landau, and Rothschild (2010) tested whether reminding people of uncontrollable hazardous in their environment would prompt them to

attribute increased influence to focal enemy figures. Half the participants read statistics indicating the prevalence of hazards resulting from forces beyond their personal control (e.g., natural disasters), whereas the other half read about the prevalence of hazards that are also negative but relatively more controllable (e.g., risky sexual behavior). As predicted, participants who were dispositionally low in perceived control responded to the salience of uncontrollable hazards by imputing increased power and influence to a personal enemy, even though the enemy’s perceived influence was superficially unrelated to the salient uncontrollable hazards. It is also worth noting that these participants did not attribute increased influence to a person who was annoying but not maliciously inclined, suggesting that control reduction affected perceptions of those who are capable of minimizing randomness and not simply those who are disliked.

This effect was conceptually replicated in a field study carried out on the eve of the 2008 U.S. Presidential Election. Participants reminded of uncontrollable hazards (vs. controllable hazards) were more likely to believe that the candidate opposing their preferred candidate was working behind the scenes to illegally influence the election to produce the undesired outcome. Note that perceiving Barack Obama or John McCain as orchestrating misdeeds does not bear any obvious relation to the uncontrollable hazards participants were reminded of, such as airborne infections and the suffering of family members. Thus, these findings suggest that attributing malevolent power to a focal enemy figure can function in a flexible manner to compensate for the perception of reduced personal control.

Scapegoating

A related line of research by Rothschild, Landau, Sullivan, and Keefer (2012) explored the role of compensatory control in scapegoating. Like enemyship, scapegoating involves attributing undue influence and power to a focal person or group perceived to be acting against one’s interests or welfare. But whereas enemyship involves perceiving the malevolent agent as responsible for multiple, diffuse sources of potential hazard, scapegoating involves perceiving the agent as responsible for a particular negative outcome that lacks a controllable cause. Common wisdom would suggest that perceiving the self to be victimized by a powerful malicious agent would undermine personal control. In contrast to this intuition, Rothschild et al. (2012) posited that scapegoating supports personal control by affording the reassuring (yet often erroneous) sense that outcomes that seem uncontrollable can be traced back to the definite motives of a definite individual or group (in Jonas et al.’s, 2014, framework, the scapegoat is a tangible focal point).

In one supporting study, participants told that global warming is occurring as a result of factors beyond their personal control attributed more responsibility for climate change to oil companies, and reported a greater desire to punish oil companies for the destruction of the environment, compared with participants who were not reminded of uncontrollable causes of climate change. Also consistent with our analysis, this effect was mediated by feelings of decreased personal control, whereas other negative self-relevant perceptions (e.g., feelings of guilt) did not play a mediating role.

Preference for Pessimistic-Yet-Orderly Health Beliefs

One of the most intense experiences of lacking control occurs when a person, or someone close to them, falls prey to a debilitating disease. The ensuing dependence, pain, and confusion create a potent cocktail of uncertainty. It seems that if there was one situation in which people would prefer hopeful information over structured information, it would be in the case of disease prognosis. Yet when this intuition was tested by Rutjens et al. (2013), they found that participants responded to reduced control by preferring a structured yet pessimistic outlook on disease progression over a less structured yet relatively optimistic outlook.

In one of their studies, after participants were reminded of uncontrollable events or negative comparison events, they were presented with two theories describing the development of Alzheimer disease. The first theory described Alzheimer as progressing in five straightforward and unvarying stages, from mild to increasingly severe cognitive stages from which there is no relief. The second theory described Alzheimer as lacking any clear stages of progression, and emphasized that large individual differences meant the symptoms progressed at different speeds from one person to another—the critical implication being that a person diagnosed with Alzheimer could hope to continue living a relatively fulfilling life for several years. Participants were asked to select which of the two theories more accurately characterized the disease. In the absence of control reduction, participants were not particularly keen on the pessimistic-yet-orderly theory, preferring it to the hopeful-yet-disorderly theory only 16% of the time. In contrast, control-reduced participants preferred it 46% of the time. Even when structure meant a darker prognosis, participants who lacked control preferred that structure over a more disorganized hope.

Meta-Analysis

The foregoing review reveals the variety of research methods used to examine the influence of compensatory control processes on the affirmation of nonspecific epistemic structure. Given our goal to formally recognize a robust and practically significant phenomenon, we statistically evaluated relevant research in a meta-analysis. As a broad quantitative synthesis of numerous studies, meta-analysis allowed us to assess the overall strength of the primary hypothesized effect as well as the role of potential moderators. The breadth of studies included allowed us to examine moderators that have not been explored in previous research, such as the region in which the data were collected, how a lack of personal control was induced, and gender.

Method

Selection criteria. We sampled multiple lines of research spanning literature in social, clinical, and personality psychology, as well as the fields of organizational behavior, marketing, and management. To be included in the analysis, studies had to (a) directly test whether personal control influenced the affirmation of a form of nonspecific epistemic structure; (b) be printed in the English language; and (c) report data that allowed for the calculation of an effect size.

For inclusion, a study's independent variable had to manipulate participants' sense of personal control either *directly* (e.g., by

means of an uncontrollable task, as in Pittman & Pittman, 1980; or recalling an episode in which one lacked control, as in Whitson & Galinsky, 2008) or *indirectly* by increasing the salience of uncontrollable factors in the external environment (e.g., by priming randomness, as in Kay, Moscovitch, & Laurin, 2010; or focusing attention on other people's inconstancy, as in Keefer et al., 2012). Studies were not included if the independent variable was stress (as measured or induced by, e.g., an impending test or conditions of military combat), unless the researchers measured perceived control to confirm that personal control differed significantly between conditions (e.g., Kay, Shepherd, et al., 2010). We did not include studies that manipulated the salience of other cognitions that threatened the self, including personal uncertainty and mortality.

We included only those studies in which the dependent variable was the affirmation of a source of epistemic structure that could not substitute for (a) affirming personal or external agency (e.g., we included studies that involved a general belief in telepathy, but not studies that only measured participants' belief that they themselves were telepathic); or (b) establishing if–then contingencies between particular actions and expected outcomes. These selection criteria allowed us to isolate control reduction's effect on affirming nonspecific epistemic structure as distinct from the three compensatory control strategies already identified in the control literature (summarized in Figure 1).

Study selection. We used three complementary methods to search for relevant studies. First, we closely examined every study previously familiar to the current authors. Second, we sent an electronic message to investigators known to research compensatory control processes soliciting in-press and unpublished studies assessing epistemic structure seeking. We posted this same message on the *Society for Personality and Social Psychology* researcher forum. Third, we conducted a database search (Web of Science, Google Scholar) in July 2014 for articles that cited landmark compensatory control papers; cited known manipulations of personal control; or included the keywords *compensatory control*, *illusory pattern perception*, and *pattern perception*. These searches combined to produce 714 unique documents. We evaluated each document's title and abstract to determine whether it merited inclusion based on whether the independent variables fell within the construct of personal control, whether the dependent variables involved structure affirmation, whether inferential statistics were present (e.g., it was not a review article, a book review, or a book that did not report statistics), and whether the article was in English. Overall, 22 documents met our inclusion criteria, from which we compiled 55 effect sizes. These are summarized in Tables 1 and 2, and shown individually in Table 3.

Statistical analyses. All effect sizes consisted of correlations between personal control (the independent variable) and affirmation of epistemic structure (the dependent variable, e.g., pattern perception, conspiratorial perceptions). We employed SPSS macros (Lipsey & Wilson, 2000) to perform the moderator analyses. All correlations were transformed with the Fisher z transformation and the inverse variance weights were derived by subtracting 3 from the overall number of participants included in the analysis (i.e., $N - 3$; Lipsey & Wilson, 2000). Because the analyzed studies included a diverse range of measures, contexts, and experimental designs, we assumed that the correlations would differ systematically and randomly from ordinary sampling error. Therefore, we

Table 1
Summary of Study Characteristics for Continuous Variables

Characteristic	Valid <i>k</i>	<i>M</i>	Range	<i>SD</i>
Sample size	55	76.02	23–218	38.1
Percentage of males	35	42.8%	10%–100%	18.1%
Participant mean age (years)	13	25.22	18–36	6.8
Effect size	55	.27	–.001 to .79	.16

employed mixed-effects models in all analyses (restricted maximum-likelihood elimination for the macros).

When a study provided more than one effect size, the effect sizes for that study were averaged into one. When studies included more than one condition contrasted to the control reduction condition, we preferred to analyze the effect sizes for the comparisons between control reduction and conditions in which participants possessed control rather than neutral or baseline conditions. Comparisons with baseline conditions were analyzed only if the study design did not include a control possession comparison condition.

The majority of articles did not test for moderating effects, and those that did used a wide variety of constructs. This, combined with the overall small number of articles ultimately eligible for inclusion, prevented us from analyzing the theoretically specified individual differences and situational moderators reviewed in Section 3. Still, in those articles where an experimental manipulation was expected to attenuate control reduction's effect on nonspecific structure affirmation, we included in this analysis conditions that excluded that factor—that is, conditions in which researchers expected to replicate the control reduction effect. Other potential moderators amenable to statistical summary are discussed in the next subsection.

Potential moderators. We first performed a homogeneity analysis for the combined effect sizes, which yielded a significant *Q* statistic, $Q(54) = 67.73, p = .09$. This indicates marginally significant variation in the distribution of effect sizes. We therefore examined the effect sizes for five potential moderators, summarized in Tables 1 and 2. Two independent raters coded the four categorical moderators and discussed differences to reconcile codes. However, the I^2 statistic was .20, indicating only mild-to-moderate heterogeneity. That is, only 20% of the variance in effect sizes was not explained by sampling variation (Higgins & Thompson, 2002).

Control manipulation. The strength of the effect may vary as a function of the method used to measure or manipulate personal control. From the various methods used across studies, we could calculate from the majority of studies (72.7%) effect sizes for three

procedures used to experimentally reduce perceived personal control: recall task (e.g., participants recalled an episode in which they possessed vs. lacked control; 65.0%); listing task (e.g., participants listed three episodes in which they possessed vs. lacked control; 17.5%); and a reading task (e.g., participants read a purported news article highlighting controllable vs. uncontrollable events; 17.5%).

Participant gender. The stereotype of masculinity, but not femininity, includes agentic qualities (Glick & Fiske, 2001; Glick et al., 2004), which are primarily related to effectiveness in goal attainment (Wojciszke & Abele, 2008). Indeed, many studies have shown that men score higher than women on measures of agency (Helgeson & Fritz, 1999). To the degree that male participants in the meta-analyzed studies invest in the qualities they identify with, it can be predicted that compensatory reactions to diminished control would be observed more strongly among men due to their agentic self-stereotype. We analyzed gender differences when this information was available. On average, the included samples consisted of 42.7% men ($SD = 18.1%$).

Region of data collection. Given the potential for different conceptions of control between different cultures (Morling, Kitayama, & Miyamoto, 2002; Rothbaum et al., 1982), it is possible that effect sizes varied between regions. When possible, we noted the region in which data were collected and categorized the studies into three classes: United States (50%); outside of the United States (including Canada, Europe, Asia, & Australia; 14.3%); and participants completing online surveys (when the article did not further specify participants' region; 35.7%).

College versus noncollege student participants. Comparing effect sizes between studies using college student samples versus other samples could indicate the extent to which the findings are generalizable to the general population. College samples were used in about 52.7% of the studies (25% of the studies did not provide sufficient information to determine sample source).

Several articles reported that data were collected on a college or university campus by approaching individuals and asking them to participate. Because campuses include not only students but also faculty, staff, visiting parents, and so on, we coded effect sizes from these samples as noncollege samples. If, alternatively, we include these effect sizes in the college student category, the *k* for the noncollege student category dropped below 5, preventing us from running further analyses.

Form of compensation. It is possible that variations in effect size stem from the form of compensation that participants received. For example, participants who were relatively well compensated may have experienced a demand to respond in confor-

Table 2
Summary of Study Characteristics for Categorical Variables

Characteristic	Valid <i>k</i>	Mode	Percentage breakdown		
Control Manipulation ^a	40	Recall task	1: 65.0%	2: 17.5%	3: 17.5%
College (Yes/No)	41	Yes	Yes: 70.7%	No: 29.3%	
Region ^b	42	U.S.	1: 50.0%	2: 14.3%	3: 35.7%
Compensation ^c	27	Course credit	1: 48.1%	2: 18.5%	3: 33.3%

^a Control manipulation: 1 = recall task; 2 = listing task; 3 = reading task. ^b Region: 1 = United States (U.S.); 2 = outside of the United States (Canada, Europe, Asia, etc.); 3 = online (country unspecified). ^c Compensation: 1 = course credit; 2 = < U.S. \$1; 3 = > U.S. \$1.

Table 3
Data Points Used in Affirmation of Nonspecific Epistemic Structure Meta-Analysis

Publications	Study ID	Manipulation	Outcome category ^a	Participants	Region	Compensation	<i>n</i>	% Men	<i>M</i> _{age} (years)	<i>r</i>
Cutright (2012)	1	—	Boundaries	Student	U.S.	—	40	—	—	0.46
Cutright (2012)	2	Recall	Boundaries	—	Online	—	59	—	—	0.06
Cutright (2012)	4	Recall	Boundaries	—	U.S.	—	85	—	—	0.22
Cutright (2012)	5	Recall	Boundaries	—	Online	—	74	—	—	0.39
Cutright (2012)	6	Recall	Boundaries	—	Online	—	99	—	—	0.05
Cutright (2012)	7	Recall	Boundaries	—	Online	—	77	—	—	0.08
Cutright et al. (2013)	1	List	Boundaries	Student	U.S.	>\$1	59	—	—	0.32
Cutright et al. (2013)	3	List	Boundaries	Adult/mixed	Online	—	93	—	—	0.30
Cutright et al. (2013)	4	List	Boundaries	Adult/mixed	Online	—	148	—	—	0.16
Friesen, Kay, et al. (2014)	3	Recall	Hierarchy	—	Online	—	100	29%	—	0.20
Friesen, Kay, et al. (2014)	4	Reading	Hierarchy	—	Online	—	168	56%	—	0.13
Friesen, Kay, et al. (2014)	5	Recall	Hierarchy	—	Online	—	85	39%	—	0.21
Friesen, Kay, et al. (2014)	6	Recall	Hierarchy	—	Online	—	142	46%	—	0.12
Friesen, Kay, et al. (2014)	7	Recall	Hierarchy	—	Online	—	69	38%	—	0.29
Goode et al. (2014a)	1	Recall	Hierarchy	Adult/mixed	U.S.	<\$1	100	65%	33.32	0.36
Goode et al. (2014b)	1	Recall	Hierarchy	Adult/mixed	Online	<\$1	64	47%	35.92	0.29
Goode et al. (2014b)	2	Recall	Hierarchy	Adult/mixed	Online	<\$1	88	42%	35.89	0.27
Greenaway et al. (2013)	1	Recall	Metaphysical beliefs	Student	Other	Credit	85	26%	18.31	0.24
Keefer et al. (2012)	1	List	Object attachment	Adult/mixed	Online	<\$1	99	31%	—	0.14
Keefer et al. (2012)	2	List	Object attachment	Adult/mixed	Online	<\$1	47	49%	—	0.39
Keefer et al. (2012)	3	List	Object attachment	Student	U.S.	Credit	51	47%	—	0.34
Landau et al. (2012)	1	Recall	Objectification	Student	—	Credit	57	100%	—	0.42
Landau et al. (2012)	2	Reading	Objectification	Student	—	Credit	87	100%	—	0.52
Landau et al. (2012)	3	—	Objectification	Student	—	Credit	44	55%	—	0.35
Legare & Souza (2014)	1	—	Metaphysical beliefs	Adult/mixed	Other	—	40	—	—	0.41
Legare & Souza (2014)	2	—	Metaphysical beliefs	Student	U.S.	Credit	94	—	—	0.34
Pittman & D'Agostino (1989)	1	—	Pattern recognition	Student	U.S.	Credit	64	—	—	0.04
Pittman & D'Agostino (1989)	2	—	Pattern recognition	Student	U.S.	—	96	—	—	0.03
Pittman & D'Agostino (1989)	3	—	Pattern recognition	Student	U.S.	—	96	—	—	0.00
Quan et al. (2011)	1	Recall	Need for structure	Student	Other	—	56	—	—	0.06
Quan et al. (2011)	2	Recall	Pattern recognition	Student	Other	—	116	—	—	0.01
Rothschild et al. (2012)	1	—	Scapegoating	Adult/mixed	U.S.	—	114	46%	—	0.31
Rothschild et al. (2012)	2	Reading	Scapegoating	Student	U.S.	Credit	61	43%	—	0.43
Rutjens et al. (2014)	1	Recall	Order providing theories	Adult/mixed	Other	—	57	—	33.95	0.63
Rutjens et al. (2010)	1	List	Order providing theories	Student	—	—	58	—	21.06	0.32
Rutjens et al. (2013)	2	Recall	Pessimistic-yet-orderly health beliefs	Student	—	Credit	59	10%	20	0.30
Rutjens et al. (2013)	3	—	Pessimistic-yet-orderly health beliefs	Student	—	Credit	43	16%	22	0.33
Rutjens et al. (2013)	4	Recall	Pattern recognition; order providing theories	Student	—	Credit	38	39%	21	0.34
Rutjens et al. (2013)	5	Recall	Order providing theories	Student	—	—	82	26%	21	0.36
Shepherd et al. (2011)	3	—	Objectification	Student	U.S.	—	60	45%	—	0.35
Stea & Hodgins (2012)	1	—	Pattern recognition	—	—	—	218	37%	21.3	0.09
Sullivan et al. (2010)	1	Reading	Enemyship	Student	U.S.	Credit	104	39%	—	0.05
Sullivan et al. (2010)	2	—	Enemyship; conspiracy theories	—	U.S.	—	59	46%	—	0.09
Sullivan et al. (2010)	3	—	Enemyship; pattern recognition	Student	U.S.	Credit	82	41%	—	0.18
Vannucci et al. (2011)	1	Recall	Pattern recognition	Student	Other	—	48	27%	—	0.29
Wang et al. (2012)	1	Recall	Metaphysical beliefs	—	—	—	154	44%	—	0.14
Wang et al. (2012)	2	Recall	Metaphysical beliefs	—	—	—	82	44%	—	0.25
Waytz et al. (2010)	2	Reading	Anthropomorphization	Adult/mixed	—	>\$1	32	53%	20.69	0.58
Waytz et al. (2010)	3	Reading	Anthropomorphization	Adult/mixed	—	>\$1	23	43%	23.39	0.79
Whitson & Galinsky (2008)	1	—	Need for structure	Student	U.S.	>\$1	29	—	—	0.38
Whitson & Galinsky (2008)	2	—	Pattern recognition	Student	U.S.	>\$1	36	31%	—	0.29
Whitson & Galinsky (2008)	3	Recall	Metaphysical beliefs	Student	U.S.	>\$1	41	37%	—	0.34
Whitson & Galinsky (2008)	4	Recall	Pattern recognition; conspiracy theories	Student	U.S.	>\$1	25	24%	—	0.42
Whitson & Galinsky (2008)	5	Reading	Pattern recognition	Student	U.S.	>\$1	44	—	—	0.35
Whitson & Galinsky (2008)	6	Recall	Pattern recognition; conspiracy theories	Student	U.S.	>\$1	50	36%	—	0.28

^a Outcome category is intended only as a guide to interpreting the reviewed findings. Because some of the reviewed effects fall into multiple categories, we recommend caution when applying this categorization to guide future research.

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mity with what they believed to be the experimental hypothesis. We categorized studies according to three forms of compensation: course credit (e.g., when students participated in exchange for extra course credit or as partial satisfaction of a course requirement); monetary compensation of less than U.S. \$1; monetary compensation of more than U.S. \$1 (when participants were compensated in currency other than U.S. dollars, the compensation was converted to the equivalent U.S. dollar amount and then coded).

Results

The effect sizes for studies testing the effect of control reduction on nonspecific structure affirmation ranged from $-.001$ to $.791$, with a weighted standard deviation of $.14$. The overall effect size was $r(55) = .24$, $p < .000$ (unweighted $r = .27$, $SD = .16$), indicating a significant relationship between personal control and the affirmation of nonspecific epistemic structure. Next we examined potential moderators. Table 4 shows the combined effect sizes (with 95% confidence intervals) across all of these specific study characteristics.

Control manipulation. The manipulation used to induce control reduction did not influence the strength of the association between control reduction and structure affirmation, $Q(2) = 1.6$, $p = .44$.

Participant gender. Using Wilson's METAREG macro for SPSS, we entered the percentage of men in each sample as the continuous predictor. We observed a marginal gender effect such that greater percentages of men positively predicted effect size ($\beta = .24$, $z = 1.69$, $p = .09$).

Region of data collection. The region in which data were collected did not significantly influence effect sizes, $Q(2) = 2.02$, $p = .36$.

College versus noncollege participants. Sample source was included as a categorical predictor using Wilson's METAF macro for SPSS. The Q statistic testing between-source difference was not significant, $Q(1) = 1.12$, $p = .29$.

Table 4
Combined Effect Sizes of Manipulations by
Potential Moderators

Grouping	<i>k</i>	Combined effect size <i>r</i> [95% confidence interval]
All hypothesized effect sizes	55	.24 [.21, .28]
Effects by control manipulation	40	.25 [.20, .29]
Recall task	26	.23 [.18, .29]
Listing task	7	.26 [.16, .36]
Reading task	7	.31 [.20, .42]
Effects by region	42	.22 [.19, .26]
United States	21	.26 [.20, .32]
Outside of the United States	6	.19 [.09, .30]
Online (country unspecified)	15	.20 [.15, .26]
Effects on	41	.28 [.23, .33]
College students	29	.26 [.21, .32]
Noncollege students	12	.32 [.24, .40]
Effects by compensation	27	.31 [.25, .36]
Course credit	13	.29 [.21, .36]
Less than \$1	5	.27 [.16, .38]
More than \$1	9	.39 [.27, .50]

Note. Effect sizes in bold face are significant at $p < .05$.

Form of compensation. Form of compensation did not significantly influence effect sizes, $Q(2) = 2.71$, $p = .26$, suggesting that participants were not influenced by the amount or form of compensation they received in return for participating.

Missing studies. To rule out the possibility that our meta-analysis failed to include appropriate studies demonstrating evidence of affirmation of nonspecific epistemic structure, we employed funnel plots and used the trim and fill procedure (Duval, 2005; Duval & Tweedie, 2000). This procedure iteratively tests the funnel plot's symmetry around the mean effect size, then imputes the missing studies and recalculates the effect size if asymmetry exists. Using Duval et al.'s linear (LO) estimate for the number of missing studies suggested that there were no studies missing. Using their more conservative R0 estimate (see Figure 2) suggested there are 3 ($SE = 2.83$) missing studies. Including these did not change the effect size estimate for the meta-analysis. In short, there was no evidence that the outcome of the meta-analysis would be substantially changed by the inclusion of any missing studies.

P-curve analysis. We used a p -curve to test whether the studies included in the meta-analysis were affected by biased statistical reporting—or “ p -hacking” as it is called (Simonsohn, Nelson, & Simmons, 2014). Figure 3 shows that p -curve for the studies included in the meta-analysis was significantly right-skewed, $\chi^2(68) = 116.85$, $p < .001$, indicating that these studies contained evidential value and that the results of our meta-analysis were not an artifact of selective or biased reporting.

Discussion

The results of the meta-analysis confirmed that individuals who feel a lack of personal control will seek to affirm structure to compensate. This analysis also revealed more specific findings that merit further discussion.

Gender emerged as a marginally significant factor, such that a greater percentage of men increased the effect size. This may reflect men's identification with a masculine stereotype of agency (Glick & Fiske, 2001; Glick et al., 2004). As we will discuss further in Section 3, the degree to which people compensate for control reduction depends in part on their level of personal investment in the domain of reduced control. And, as noted in the Method section, men generally feel a stronger sense of personal agency and control over their lives compared with women. This may account for why men show stronger compensatory reactions to situations and information that diminish their perceived control.

No differences were found based on manipulations of control, regional differences, how participants were compensated for their participation, or whether the sample involved college versus noncollege students. The latter finding should be interpreted with caution because data gathered from college campus samples, but not undergraduate samples in particular, were included in the noncollege category. If the majority of participants in the college campus samples were students versus nonstudents, then the lack of difference between these two categories is unsurprising. Including college campus samples in the college student category was, as mentioned, statistically unfeasible.

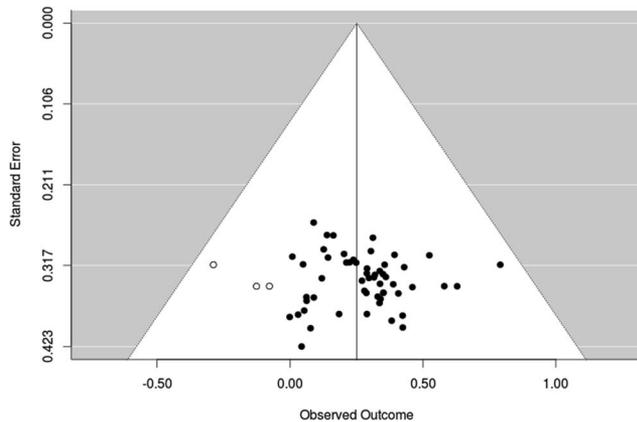


Figure 2. Funnel plot of standard error by the control and affirmation of nonspecific epistemic structure correlation, with 3 imputed effect sizes.

Section 3: Individual Differences and Situational Moderators

The studies reviewed thus far have demonstrated the effect of control reduction on diverse tendencies to seek and prefer simple, clear, and consistent interpretations of the social and physical environments. Taken together, these findings support our claim that the affirmation of nonspecific epistemic structure is a robust compensatory control strategy that has been largely overlooked in the mainstream control literature. Still, it is unlikely that control reduction motivates compensatory structure affirmation equally for all people and across all situations. What factors exaggerate or attenuate this phenomenon? Although many factors likely play a moderating role, research has so far identified four. In this section, we review studies that have shown that individual and situational variations in these factors predict the degree to which people cling to nonspecific structure in response to reduced control. Table 5 summarizes these findings.

Investment in the Domain of Reduced Control

When people encounter events or cognitions that potentially reduce their perceived control in a given domain, they are most likely to experience negative arousal, and thus compensate, to the extent that they are invested in that domain. This investment may derive from the belief that achieving goals within that domain is an important basis for earning and maintaining a feeling of personal worth or meaning in life. It may also derive from the perception of strong social pressures to care about or perform well in that domain.

In one study assessing this possibility (Landau et al., 2012; Study 1), male participants first indicated how much they derived a sense of personal value from their ability to influence women as well as other men. Then, one group was led to doubt their ability to influence women at a subjective level (control reduction). Compared with men in a neutral condition, control-reduced men showed increased objectification of women, but only if they previously indicated a high investment in influencing women. In contrast, men's self-reported investment in influencing other men did not moderate the control reduction's effect on objectification

of women, ruling out the alternative possibility that the observed interaction was simply due to men's desire to influence other people in general.

A follow-up study (Landau et al., 2012; Study 2) included a situational manipulation of men's investment in the domain of reduced control. Half the men read an article discussing the importance of influencing women for their own health and well-being; the other half read a parallel article discussing the importance of influencing other men. Among men focused on the importance of influencing women, those also led to doubt their ability to influence women's subjective states (control reduction) showed increased objectification. This effect emerged in comparison to men led to doubt women's ability to influence other women, and is therefore not due simply to the salience of complications in controlling others, regardless of the relevance of those complications to the self. Instead, it suggests that objectification serves to simplify the social world and, in this way, functions to compensate for reduced perceived control in a personally valued domain.

Alternative Opportunities to Affirm Nonspecific Structure

Our analysis posits that people compensate for low or reduced control by seeking a sense of global order and structure in the world. This suggests that when control is low and the desire for structure is consequently high, people's tendencies to seek and prefer structured interpretations will differ according to whether they have an opportunity to affirm structure through an alternative route—that is, in a manner that is unrelated to the primary structuring outcome. Evidence for this possibility would support our claim that the need for structure is the link in the causal chain connecting perceived control to the various structuring tendencies examined in the studies we have reviewed.

Cutright et al. (2013) tested this hypothesis. They asked marketing and sales managers to recall a few times when they lacked control in their jobs (control reduction) or not. Next, they manipulated whether participants had an opportunity to affirm structure. Half the managers were directed to place logos into clear categories (an effective means of asserting structure; Moskowitz, 1993; Neuberg & Newsom, 1993), whereas the other half simply counted the logos. Finally, participants reported their attitudes toward poor-fitting brand extensions (extensions that violated the brand's accepted boundaries) and good-fitting extensions. Control reduction led managers to derogate poor-fit extensions, but it did not affect their attitudes toward good-fit extensions. Critically, this effect was eliminated if participants had the opportunity to affirm structure before they evaluated brand extensions, even though the structure affirmation task was unrelated to the brand extension outcome.

Chronic and Temporary Availability of Personal or External Agency

Contemporary theories of psychological threat and compensation summarized in Section 1 share in common the hypothesis that compensating for threatening cognitions reduces their cognitive accessibility and eliminates the need for additional compensatory response. Supporting evidence from the terror management liter-

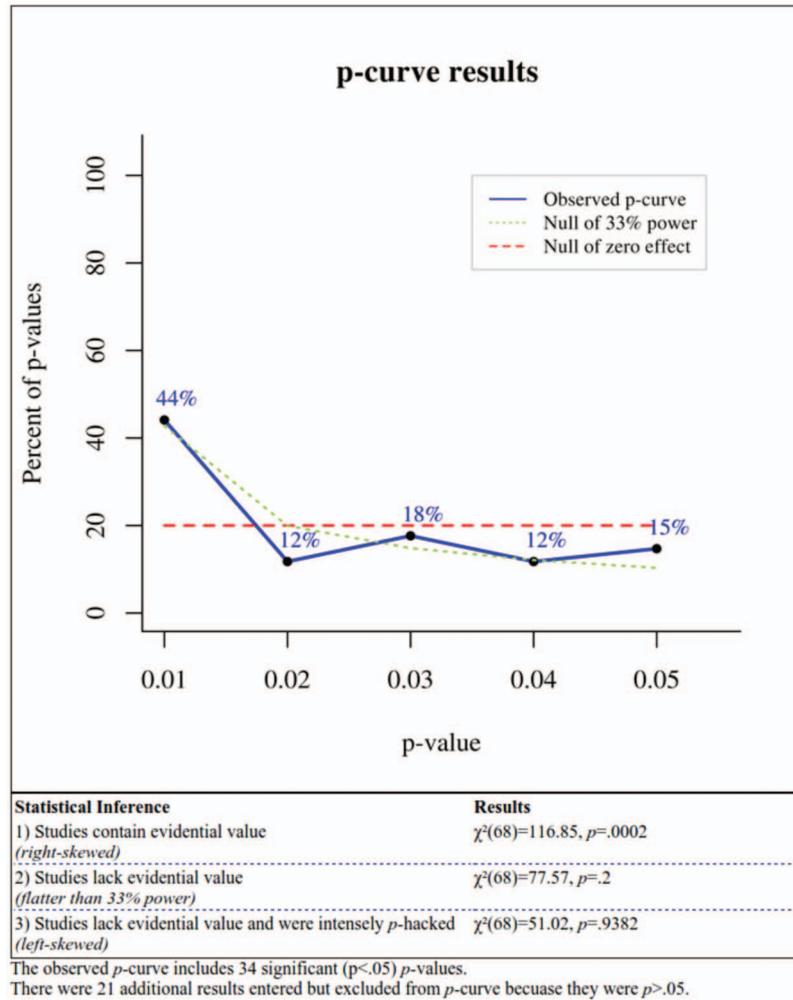


Figure 3. P-curve for studies included in the meta-analysis. See the online article for the color version of this figure.

ature, for example, has shown that, after a mortality reminder, trait and state increases in one element of the anxiety buffer (e.g., bolstering self-esteem) makes people less likely to defend another element (e.g., defending their cultural worldview; Greenberg et al., 2008).

On the basis of this work, we would expect that control reduction's effect on nonspecific structure affirmation will be attenuated or eliminated if alternative compensatory control strategies are readily available. The availability of alternative strategies is likely to be influenced by factors of the individual (e.g., chronic accessibility of control-restoring beliefs) and the situation (e.g., contextually salient beliefs about external systems of control). Before we review relevant studies, it is important to clarify that we do not claim that bolstering personal or external agency are the "default," or universally privileged, compensatory strategies; nor do we claim that these strategies are necessarily more effective than structure affirmation at restoring control after it has been reduced. Rather, we hypothesize that employing these compensatory strategies will decrease the need for further efforts to restore personal control, just as affirming nonspecific epistemic structure would

hypothetically attenuate the need for additional bolstering of personal or external agency (although this latter possibility falls outside of our current scope).

A study by Sullivan et al. (2010; Study 1), mentioned in Section 2, shows that individual differences in perceived personal control moderate control reduction effects. The researchers reasoned that individuals with high (vs. low) trait levels of perceived personal control could more readily recruit memories and beliefs supporting their personal agency, and therefore would not need to compensate further by means of structure affirmation. Participants completed Duttweiler's (1984) Internal Control Index weeks prior to the experimental sessions. During the sessions, participants who reported low levels of perceived control responded to the salience of uncontrollable (vs. controllable) hazards by perceiving a personal enemy as having a stronger impact on their daily lives. Yet this compensatory structure affirmation was not observed among participants who generally felt strongly in control of their lives. Cutright (2012) similarly found that individuals who felt they possessed a strong stock of social, material, and personal resources did not respond to control reduction with increased preference for

Table 5
Individual Differences and Situational Moderators: Low and Reduced Perceptions of Personal Control Increase Compensatory Affirmation of Nonspecific Epistemic Structure Particularly Under the Following Conditions

	Operationally defined as:
1. The person is highly invested in the domain of reduced control.	<ul style="list-style-type: none"> • High trait or experimentally increased valuing of domain (Landau et al., 2012).
2. The person lacks alternative opportunities to affirm nonspecific epistemic structure.	<ul style="list-style-type: none"> • No situational opportunity to categorize (Cutright et al., 2013).
3. The person lacks opportunities to affirm personal or external agency.	<ul style="list-style-type: none"> • Low trait personal control (Cutright, 2012; Sullivan et al., 2010). • No situational opportunity to affirm personal agency in another domain (Rothschild et al., 2012). • Low trait faith in God (Cutright, 2012). • Situational exposure to a passive God vs. a controlling God (Rutjens et al., 2014). • Portraying the government as disordered/ineffectual (Sullivan et al., 2010).
4. The person perceives target knowledge source as affording simple, clear, and consistent interpretations of the world.	<ul style="list-style-type: none"> • Portraying a brand extension as maintaining vs. violating the brand's boundaries (Cutright et al., 2013). • Portraying evolution as nonrandom vs. random (Rutjens et al., 2010). • Portraying scientific theories as categorical vs. continuous (Rutjens et al., 2013). • Portraying hierarchy as an ordered vs. disordered social organization (Friesen, Kay, et al., 2014). • Portraying an enemy figure as a viable vs. nonviable source of random outcomes (Sullivan et al., 2010).

consumer objects with clear aesthetic boundaries over those who did not.

Rothschild et al. (2012; Study 2) conceptually replicated these findings with a situational manipulation of personal agency affirmation. Participants led to focus on uncontrollable (vs. controllable) causes behind climate change were more likely to blame and penalize international corporations for their role in climate change. This effect was eliminated if participants were asked to write a few sentences asserting their agency in a domain other than climate change. In contrast, participants given the opportunity to affirm their moral value in another domain continued to show increased scapegoating, even though the agency and moral value affirmations were equivalent in positive valence. Taken together with Sullivan et al.'s (2010) findings just mentioned, these studies show that people compensate for reduced control by focalizing negative outcomes on to a single, comprehensible source, but they do not

cling to this structured interpretation if beliefs about personal agency are dispositionally or contextually close at hand.

The opportunity to bolster external agency plays a similar moderating role. The effect of control reduction on nonspecific structure affirmation is attenuated when people have the opportunity to view benevolent external systems as influencing outcomes on their behalf. The availability of this alternative strategy depends, in part, on individual differences in belief in higher powers. In one study (Cutright, 2012), individuals with a strong belief in God did not respond to control reduction with increased preference for products that are well-bounded. Rather, it was only for those who were unable to turn to religion as a source of control—that is, those very low in religious belief—that a personal control reduction increased the appeal of clear boundaries.

Experimental evidence for the moderating role of divine agency beliefs comes from a study by Rutjens, van Harreveld, van der Pligt, and Bremmer (2014). As described in the subsection on order-providing theories, this study compared preferences for two versions of evolution theory—one that is more controlled and structured (Conway Morris's) and one that is more random (Darwin's). As expected on the basis of prior work and theory, preference for Conway Morris's structured account increased following control reduction. But most notably, this effect disappeared entirely if participants were first asked to think about God as an intervening, controlling force. That is, when an alternative means of restoring control was made salient before the choice paradigm, the control reduction manipulation exerted no impact on relative preference for the two scientific theories. Importantly, though, this effect only disappeared if participants were asked to consider a controlling God—that is, a God that confers predictable order on the world. Participants asked to think of a passive God instead showed the same effect of the control manipulation as those asked to think of nothing at all.

In related experiments, Sullivan et al. (2010) manipulated the perception that a benevolent secular system possesses the necessary resources to act in one's best interests. They reasoned that if the external system is made to appear ineffectual, then people will not invest in it as a means of compensating for reduced control; instead, they will seek to affirm the perception that the world is ordered, such as by ascribing increased influence to an enemy.

They tested this hypothesis by manipulating whether American participants saw the United States as a relatively ordered system in which economic and law enforcement institutions can be relied on for security or a relatively disordered system in which the economy is fragile and the government unreliable. When participants were led to view governmental institutions as intact and capable, those reminded of uncontrollable hazards ascribed increased power and influence to the U.S. government (replicating Kay et al., 2008), but their enemy perceptions were unaffected.

In contrast, when the same governmental institutions were portrayed as ineffectual and unable to provide protection from external threats, participants reminded of uncontrollable hazards did not affirm that system; rather, they were more likely to view a personal enemy as responsible for seemingly random misfortunes in their life (e.g., lost computer files, contracting food poisoning). When the broader social system appears disordered, people lack the

opportunity to affirm external agency, and opt instead for structured interpretations of their environment.

Perception of Target Knowledge Source

It is unlikely that any given belief, ideology, or other piece of knowledge is inherently a compelling source of nonspecific structure. Instead, a knowledge source's structure affordances are likely to vary across individuals and situations. For example, one person may find a given political ideology to provide a neatly organized conception of reality, whereas another person, or the same person in a different context or developmental stage, may reject the same ideology as disorganized.

Empirical support for this possibility comes from studies, reviewed in Section 2, that have shown that control reduction increased the affirmation of constructs when they were portrayed as affording structured interpretations of the world, but not when the same constructs were portrayed as lacking structure. To recapitulate these results: When evolutionary theory was presented in terms of an orderly unfolding, people preferred it to a religious account of creation following reduced control, reversing the baseline preference for the religious account. But when evolutionary theory was described in terms of random mutations, this effect was eliminated (Rutjens et al., 2010; Rutjens et al., 2014); control reduction increased the appeal of scientific theories (e.g., of moral development) portrayed as positing fixed stages, but not when the same theories were portrayed as positing less predictable processes (Rutjens et al., 2013); control reduction increased the appeal of social hierarchy, but not if hierarchy was portrayed as a disordered form of social organization (Friesen, Kay, et al., 2014).

Related studies have revealed other, more nuanced, factors influencing people's perceptions of potential structure sources. Consider the case of enemyship and scapegoating. To serve as a single, comprehensible source of seemingly uncontrollable hazards, an enemy or scapegoat must be *viable*, meaning that the person or group in question is perceived as sufficiently powerful and malevolent to perpetrate the threatening outcomes that need to be explained (Glick, 2005). To elaborate, because scapegoats and enemies are relied on to explain how multiple, seemingly random outcomes are traceable to a single human source, those employing this strategy need to perceive the target person or group as capable of perpetrating those outcomes (most likely through secret alliances and other surreptitious tactics). If a person or group appears patently incapable of causing those outcomes—if, for instance, their powers are formidable but confined to a narrow domain, or they appear too weak to have exerted the amount of influence necessary—then they are nonviable as an enemy figure and will not afford epistemic structure.

Supporting this analysis, Sullivan et al. (2010) found that if participants were reminded of uncontrollable hazards in their environment, and were then presented with a portrayal of an enemy (the terrorist organization Al-Qaeda) as possessing the power to perpetrate a wide array of seemingly random outcomes, they perceived fewer chaotic risks in their environment. Specifically, they felt more confident that they would not encounter random misfortunes (e.g., unexpected travel complications) in the future. In fact, when participants were provided with a viable enemy, they perceived less random risk than did participants who were not reminded of uncontrollable hazards in the first place. This effect

did not occur, however, among participants exposed to a portrayal of Al-Qaeda as very powerful but limited in its reach (hence capable of perpetrating only a few, albeit highly threatening, outcomes), or those exposed to a portrayal of Al-Qaeda as lacking power.

Participants led to view Al-Qaeda as having wide-ranging power also reported a stronger sense of personal control than participants in the comparison conditions, and this effect was mediated by decreased risk perceptions (we will revisit this mediation effect in the General Discussion). Thus, contemplating a powerful enemy when one is motivated to compensate for reduced control can imbue the world with order and restore a sense of personal control, but only when that enemy is a viable source for what might otherwise appear to be random and chaotic outcomes.

Research has recently addressed another potential moderating factor: the degree to which a given source of knowledge is portrayed as unfalsifiable—that is, immune to being proven incorrect, contradictory, or nonexistent. A knowledge source portrayed as in principle beyond refute would seem to provide an especially confident basis for perceiving the world as a structured place. This can explain people's preference for different types of worldviews. For example, religious worldviews may be preferred to secular worldviews because they are stubbornly resistant to disproof (e.g., under the assumption that apparent counterexamples, such as random tragedies, can be explained away as part of a coherent, albeit mysterious, cosmological plan). It can also explain people's preference for particular versions of a given ideology, such as psychoanalysis or White supremacy, that are not (vs. are) amenable to empirical falsification. Even in the case of science—a worldview that is presumably built on the notion of falsifiability—people may transform this source of order and control into something that approximates unfalsifiability: Although someone can disprove a specific finding or hypothesis or even theory, the ardent believer in the scientific method can always place his or her faith in the integrity of the scientific process, over time, beyond any discrete event or outcome. The psychological appeal of unfalsifiability was recently demonstrated in studies by Friesen, Campbell, and Kay (2014), who showed that the more a given worldview or belief system is viewed as unfalsifiable, the more strongly it is adopted, and when a given worldview or belief is threatened, the more people imbue it with unfalsifiability. Future research should test whether these tendencies are exacerbated following control reduction.

General Discussion: Theoretical and Practical Implications

Thus far, we have aimed to identify a unique psychological phenomenon—the compensatory affirmation of nonspecific epistemic structure in response to low or reduced personal control—and to demonstrate the far-reaching consequences of this phenomenon for how people perceive and make judgments and decisions about their social and physical environments. Situating this discovery in the control motivation literature will contribute to an understanding of the processes by which people maintain perceived control in their everyday lives. To accomplish this, we address three theoretical questions: If people are given the choice of compensatory control strategy, what factors influence their preference? Does the affirmation of nonspecific structure in fact

function to support perceived personal control? How does episodic structure relate to goal-directed action?

Choice of Compensatory Strategy

In Section 1, we described three compensatory control strategies identified in prior theory and research on control motivation. We complemented this picture by proposing that nonspecific structure affirmation is a common yet largely unrecognized compensatory strategy. This raises an additional question: When people encounter control-reducing events or cognitions, how do they choose, consciously or otherwise, which strategy they will employ to restore personal control? Why, for example, might one person cling vigorously to a belief in social hierarchy, whereas another person, or the same person in a different context, opts to view herself as a beneficiary of positive influence or to aggrandize her abilities?

We have already seen that control reduction does not invariably increase nonspecific structure affirmation. In many of the studies reviewed in earlier sections, factors of the person and situation moderate this effect. Still, in the majority of those studies, participants were not provided with opportunities to select from among multiple compensatory strategies. Hence, understanding preference among compensatory strategies requires a closer look at CCT as well as related theories and research findings in the threat compensation literature.

A preliminary point is in order. In many real-world contexts where people confront control-reducing conditions, affirming a given resource will likely serve two or more strategies. For example, adhering zealously to religious beliefs may bolster external agency (through faith in beneficent intervention), affirm specific epistemic structure (by specifying consequences of moral conduct), and affirm nonspecific epistemic structure (portraying the universe as obeying a few well-observed and immutable laws). Granting this point, it is likely that some resources are especially suited to a given strategy; thus, it is useful to model the factors influencing strategy choice.

One factor to consider is the availability of strategies in the person's immediate social context. This is demonstrated in a study by Sullivan et al. (2010; Study 3), which is, to our knowledge, the only experimental study to give participants the opportunity to employ multiple compensatory control strategies. The researchers examined the effect of control reduction on external agency beliefs and nonspecific structure affirmation, the latter operationalized as attributing seemingly random outcomes to an enemy's machinations.

The key moderator was the contextually salient portrayal of the broader social system. Only when the broader social system was portrayed as disordered and ineffectual did participants respond to reduced control by attributing influence to an enemy. Perceiving powerful enemies as having influence over one's life is an especially useful means of compensating for reduced control when the broader social system is viewed as incapable of providing protection from harm. In contrast, participants led to view the system as ordered did not respond to reduced control by attributing influence to an enemy. Rather, they invested more strongly in the belief that the U.S. economic political system is powerful and resilient.

This latter finding is conceptually consistent with Kay et al.'s (2008) finding that people compensate for control reduction by

bolstering the government's power and legitimacy. But it goes further to show that when the system is perceived as disordered, ascribing power to one's enemies, not the government, is a preferred compensatory strategy. At the same time, portraying the system as ordered did not simply attenuate compensatory reactions to reduced control. Instead, it created a psychological environment in which the preferred means of compensating was to bolster external agency.

Future research along these lines should model the choice between nonspecific structure affirmation and bolstering personal agency. Recall the finding (Sullivan et al., 2010; Study 1) that individuals with a high level of personal control did not respond to reduced control with compensatory structure affirmation in the form of enmity (see Cutright, 2012, for similar individual difference moderation). Yet, in that study, participants did not have the opportunity to compensate through the alternative strategy of bolstering personal agency. If they had, we might expect individuals who chronically perceived themselves as in control, and similarly those whose perceived control was temporarily bolstered, would have compensated by affirming their mastery over the environment. That is, high and increased personal control may not only attenuate compensatory responses altogether, as we saw in Section 3, but may also channel compensatory efforts in the direction of fortifying personal agency and willpower. Some indirect evidence for this possibility comes from studies that have shown that individuals high in self-esteem—which is conceptually related to perceived personal control—are more likely to respond to psychologically threatening stimuli by attempting to directly restore a sense of personal agency, whereas those low in self-esteem prefer to employ less direct strategies (McGregor, 2006; Tangney et al., 2004).

This brings us to the choice between specific and nonspecific structure. We have seen in multiple studies that control reduction increases the appeal of structured knowledge in domains that are remote from the instigating condition. Together, this work reveals cross-domain fluidity in compensatory control processes. Yet none of these studies tested the possibility that people prefer to compensate for reduced control in a more direct, proximal manner by establishing clear contingencies between actions and outcomes within the domain of reduced control.

Future research assessing this possibility should examine, as one potential moderator, the degree to which the person is consciously aware of the control-reducing condition. Compensatory control strategies are triggered by the individual's assessment of low or reduced control, but it is possible that this assessment takes place at more or less explicit levels of conscious awareness. Here we can gain insight from TMT's proposition that thoughts of death are managed with two types of defenses, each corresponding to the perceptual system in which these thoughts are active (see Hayes, Schimel, Arndt, & Faucher, 2010, for more extended coverage). Thoughts of death that enter consciousness are managed through *proximal defenses* that are rational in nature and typically involve suppressing the thoughts through distraction, reducing self-focused attention, trivializing one's vulnerability to death in the near future, and taking proactive efforts to reduce vulnerability by engaging in healthy decisions. Once these defenses remove thoughts of death from consciousness, death thoughts remain non-consciously accessible (death-related cognitions can also be activated in the unconscious directly via subliminal priming). When

death thoughts are activated outside of conscious awareness, they are managed through *distal defenses* that include efforts to shore up faith in the cultural worldview and attain self-esteem—defenses that bear no logical or straightforward relation to mortality.

Extending this model to compensatory control strategies, we might expect that when cognitions about low personal control are active in the person's focal awareness, he or she will prefer to compensate by affirming specific structure—that is, in a manner that bears directly on the instigating condition—and will view remote sources of epistemic structure as too tangential to be consoling. In contrast, if those instigating cognitions are activated in a more subtle manner, such as by a temporary thought induction or brief exposure to statistics about uncontrollable hazards, or if control-reducing cognitions are activated unconsciously (e.g., by means of semantic priming), people will be equally attracted to sources of specific and nonspecific structure. That is, when control reduction is explicit, people may expect an adequate source of structure would, at minimum, be relevant to the control-reducing event or cognition. But when control reduction is implicit, this expectation of relevance may be relaxed, with the result being that specific and nonspecific structure sources are functionally equivalent strategies for control compensation.

We propose another variable that may constrain or guide the type of compensation enacted following control reduction: level of goal abstraction. Goals can be very specific, with clear ends, or can be relatively more abstract (Emmons, 1992; Locke & Latham, 1990; Vallacher & Wegner, 1989). For example, George might have the goal to make Lucy fall in love with him (specific), to find a woman to fall in love with him (less specific, more abstract), or to be globally happier (abstract). Likewise, Hannah might aim to finish a work project by a certain date (specific), get promoted or earn a raise (more abstract), or succeed professionally (abstract). Many studies have shown that construing goals at varying levels of abstraction has significant consequences for outcomes such as self-regulation and affect (Emmons, 1992; Freitas, Salovey, & Liberman, 2001). For example, when people construe a goal at a specific level, they tend to employ more focused and direct means to achieve that goal (Locke & Latham, 1990).

How might the level of goal abstraction moderate compensatory control strategies? We propose that when people represent their goal in relatively more specific terms, they will tend to compensate for reduced control with more direct, proximally relevant strategies. For example, consider the question of whether one responds to reduced control by affirming specific versus nonspecific structure. We expect that if a person is focused on a very specific end, she will be more likely to affirm specific structure, whereas if she is focused on an abstract or general goal, she will prefer to affirm nonspecific structure.

For example, if Hannah held the goal to complete a specific work project well (a specific goal), then convincing herself that this is the type of project in which hard work and effort reap good results might be the most likely form of compensatory control. Or if George hoped to woo Lucy specifically, he might be best served by assuring himself that Lucy has a predictable set of likes to which she responds favorably and a predictable set of dislikes to which she responds unfavorably. On the other hand, if goals are considered more abstractly—for example, if Hannah's aim is to succeed professionally or George's goal is to find happiness—affirming nonspecific structure that supports action across situa-

tions and domains may be the more likely (or even necessary) response. A similar analysis might also apply to predicting when individuals will be likely to eschew nonspecific structure in favor of bolstering personal agency or appealing to external agents aligned with the self. If a goal is represented at a specific level, the individual will likely appeal to an entity (themselves or a benevolent external agent) that can facilitate this particular goal (e.g., “Please God, let Lucy say yes when I ask her out!”). But if the goal is represented at more abstract levels, such that the particular means to attain it become less pertinent, affirming nonspecific structure might be a preferred compensatory strategy, again because it supports confident action across situations and domains.

Personal need for structure. One might interpret our foregoing discussion as claiming that nonspecific structure is a “last resort”—a compensatory strategy that people employ only when other strategies are blocked. But it is possible that individual difference variables predispose some people to prefer nonspecific structure over other available strategies. One such variable is the person's trait level of global preference for structured knowledge of the world. Starting with Rokeach's (1960) influential work, a large body of personality research has shown that people vary widely in their preference for epistemic structure. Individuals with a high (vs. low) trait preference for structured knowledge—measured with scales such as Need for Closure (Kruglanski, Webster, & Klem, 1993) and Personal Need for Structure (PNS; Neuberg & Newsom, 1993; M. M. Thompson, Naccarato, Parker, & Moskowitz, 2001)—generally prefer simple and clear-cut interpretations of social information, and they respond aversely to complexity, ambiguity, and disorder. For example, individuals with a high need for structured knowledge are more likely to endorse simplifying group stereotypes than are individuals who are relatively more tolerant of ambiguity and complexity (Kruglanski & Webster, 1996; Moskowitz, 1993).

On the basis of this work, it may be tempting to assume that individuals with high, but not low, need for structured knowledge would respond to control reduction with increased preference for epistemic structure over other compensatory strategies. Consistent with this possibility are main effects such that PNS correlates positively with many of the epistemic structuring tendencies described thus far, including preference for hierarchy (Friesen, Kay, et al., 2014) and aesthetically bounded (vs. unbounded) stimuli (Cutright, 2012).

Yet the results of recent research and theory have suggested that a different pattern of moderation is equally plausible, one in which the strongest effects are observed among those low, rather than high, in PNS (Banfield, Kay, Cutright, Wu, & Fitzsimons, 2011; Nail & McGregor, 2009; Nail, McGregor, Drinkwater, Steele, & Thompson, 2009). The reasoning behind this prediction is that whereas high PNS individuals, regardless of context, are chronically motivated to seek and prefer structured knowledge, low PNS individuals may display this motivated tendency particularly when they experience control reduction.

This prediction is consistent with contemporary social-cognitive models of self-regulation, which suggest that goals can vary in strength both chronically and contextually (Shah & Kruglanski, 2000). For some individuals, a given goal may be chronically accessible, whereas for other individuals that goal may become active only in certain situations. For example, some people are chronically achievement oriented, always trying their hardest

on a quiz, whereas others care about achievement only when they think about their judgmental mother (Fitzsimons & Bargh, 2003). Another motivational state, the need to justify the broader social system (Kay & Zanna, 2009), exhibits the same basic pattern of chronic and contextual variability: Individuals high in chronic need for system justification defend the system more vociferously than those low in this need, but, following a manipulation of system threat (which activates the system justification motive), low-need individuals defend the system as strongly as do high-need individuals (Banfield et al., 2011; van der Toorn, Nail, Liviatan, & Jost, 2014).

Thus, to the extent people high in PNS are chronically motivated to seek and maintain structured knowledge, and control reduction motivates a similar set of preferences, we would expect this same pattern of interaction. Initial support for this possibility comes from a study that showed that high PNS individuals tend to prefer hierarchy more than low PNS individuals, but when control is reduced and compensatory control motivation is high, low PNS individuals crave hierarchy as much as high PNS individuals (Friesen, Kay, et al., 2014). Future work should examine whether this interaction pattern holds in the case of other structuring tendencies.

It is interesting that the opposite pattern emerges when PNS is crossed with the salience of other psychological threats. For example, mortality salience heightens structure-seeking tendencies in individuals who are high, but not low, in PNS (see Greenberg, Landau, & Arndt, 2013, for a review). How can we reconcile these divergent effects? Given the presumed direct relation between terror management motivation and self-esteem maintenance, it makes sense that people who embrace structure seeking as a valued aspect of their self-concept would respond to mortality salience by affirming that penchant with increased zeal. That is, insofar as people assuage mortality concerns by clinging to sources of personal value, high PNS individuals should cling avidly to structure when mortality is salient, whereas low PNS individuals would be expected to embrace whatever worldviews they derive self-esteem from, even to the point of actively rejecting structure and affirming novelty instead (Vess, Routledge, Landau, & Arndt, 2009). When control is reduced, however, people seek to affirm basic structure not as a means to bolster their self-esteem, but to see the world as manageable and controllable. Hence, under these conditions, low PNS individuals resemble their high PNS counterparts in structure seeking. The fact that both control reduction and mortality salience heighten structure seeking, but interact with PNS in divergent ways, attests to the utility of complementing metatheoretical models such as Jonas et al.'s (2014) with more fine-grained accounts such as the one offered in this article.

Cultural factors. As with individual difference variables such as PNS, a person's cultural context is likely to influence his or her choice of compensatory control strategy. Prior work has suggested that some cultural contexts inhibit people from bolstering personal agency. This may be the result of cultural norms' influence on self-construal. For example, individuals who hold more interdependent models of the self are less likely to see themselves as in control of their fate (Young & Morris, 2004). Consequently, they may be more likely to compensate by affirming nonspecific structure than individuals socialized in cultural contexts that promote more agentic self-construal.

Aside from cultural norms, aspects of the person's social, historical, and geographic context might undermine the perception that one has control over one's environment and life in general. As a result, individuals may find that affirming nonspecific structure is a more accessible compensatory strategy than bolstering personal prowess. Consistent with this possibility is evidence that cultures characterized by a history of territorial conflict and ecological threats (e.g., natural disasters) tend to have "tight" (vs. "loose") social structures that involve clearly dictated rules, strict hierarchies, and clearly defined social ceremonies (Gelfand, Nishii, & Raver, 2006). Perhaps conditions that offer fewer situational affordances for responding to control reduction with personal agency orient the person to find solace in highly structured conceptions of how the world works.

Other cultural contextual factors may deprive individuals of the opportunity to bolster external agency. For example, individuals socialized in Western regions of the United States generally put little stock in the power of the government (perhaps because during the period in which they were settled, the central government was too distant and small to prove effective; Lipset, 1990; Vandello & Cohen, 1999). For them, investing faith in the power of government control may not provide a compelling means of restoring control. As a result, they may be more likely to compensate by affirming nonspecific structure. Further research is clearly needed to understand the potential role of these and other cultural factors in moderating compensatory control processes.

Modeling how cultural factors influence choice of compensatory control strategy is a useful approach, but it is somewhat coarsely grained because compensatory strategies are likely to interact in nuanced ways. A complementary approach examines how cultural factors predispose people to respond to reduced control with particular forms of structure seeking that are consistent with their broader cultural worldview. Wang, Whitson, and Menon (2012) took this approach to studying how cultural context moderates the effect of control reduction on increased belief in astrology. They built on evidence that Western (primarily North American) cultural contexts emphasize primary control, encouraging responses grounded in personal efficacy, whereas East Asian contexts emphasize secondary control, encouraging responses grounded in indirect control (Morling et al., 2002; Rothbaum et al., 1982). They reasoned that control reduction experienced by individuals from a cultural context that foregrounds one type of control will prefer to compensate by structuring reality in a manner that is congruent with that type of control. Supporting this reasoning, they found that, following a control reduction, individuals from Western contexts (who preferred personal efficacy) showed increased belief in horoscopes that described themselves; in contrast, individuals from East Asian contexts (who preferred external efficacy, i.e., achieving desired outcomes via others) showed increased belief in horoscopes that described their friends.

Future research in this vein should also consider the role of socioeconomic status (SES). Consistent with findings that members of low SES communities embrace a more collectivist model of control—one that leverages personal relationships and group support—it has been observed that whereas those higher in SES tend to turn to their material resources when control is diminished, those lower in SES turn to invest more in their personal relationships and community (Piff, Stancato, Martinez, Kraus, & Keltner, 2012). Extrapolating from these findings, and building on Wang et

al.'s (2012) findings just mentioned, we might expect that control reduction will orient high SES individuals to seek and prefer highly structured interpretations of their personal relation to the external world, whereas low SES individuals will prefer to seek out structured interpretations of their interpersonal relationships, social groups, and the relation of those collective entities to the broader world.

Does Nonspecific Epistemic Structure Buttress Personal Control?

We have been highlighting the causal impact of control reduction on nonspecific structure affirmation. This raises the question of whether affirming nonspecific structure in fact buttresses people's sense that they are in control of their lives. Initial empirical evidence has suggested that the answer is yes. In one study, mentioned in the section Perception of Target Knowledge Source, Sullivan et al. (2010) reasoned that if people have the opportunity, following control reduction, to perceive a powerful enemy capable of perpetrating seemingly random outcomes—that is, if they could project some order and structure on the world, even if it entails being victimized—they would perceive themselves as having more control. That is, whereas conventional wisdom would seem to suggest that exposure to a powerful and malicious enemy would increase perceptions of random risk in the environment, the researchers hypothesized that perceiving an enemy figure as the focal source of multiple random hazards would bolster perceived control. This is exactly what they found. Participants under control reduction who read that Al-Qaeda was secretly plotting to destroy them reported increased perceptions of personal control, and this effect was mediated by reduced perceptions of random risk in the environment.

Rothschild et al. (2012) conceptually replicated this effect. Participants first read that climate change was uncontrollable or controllable, and were then led to focus on a group that either could be legitimately blamed for climate change (oil companies) or could not be (the Amish). Among control-reduced participants, those presented with a viable scapegoat showed a boost in perceived personal control compared with participants who were not given the opportunity to scapegoat. Evidence that personal control can be enhanced by perceiving a powerful agent working against one's interests is unlikely to reflect the bolstering of external agency, as it has been traditionally defined and operationalized. Instead, these findings corroborate the current claim that nonspecific structure affirmation enhances perceived personal control.

Affirming other sources of structured knowledge has also been shown to increase perceived control. Friesen, Kay, et al. (2014) showed that control reduction leads people to prefer social hierarchy over equality. Yet they also observed that the perception of hierarchy in one's workplace (especially hierarchy derived from clear, transparent rules) positively predicted feelings of control in the workplace. The converse is also true: Perceived disorder threatens the individual's sense of personal control. Chae and Zhu (2014) showed that participants who completed tasks in a disorderly (vs. orderly) lab environment felt less in control.

These emerging findings are broadly consistent with our current analysis, yet they also suggest an alternative mechanism. If affirming nonspecific epistemic structure promotes perceived personal control, is it simply an indirect means of bolstering personal

agency? Although this is a possibility, we propose a more parsimonious and empirically substantiated account. Cognitions about agency (located in the self or an external system), and cognitions about the environment, are psychologically distinct sources of perceived personal control. Both are necessary to maintain perceived control, yet neither is sufficient on its own. The implication is that control reduction will lead people to affirm both agency and structure, depending on which is chronically or situationally available. This explains why, as we have seen in many studies, control reduction increases the appeal of structured interpretations that are unrelated to agency beliefs as well as those that ostensibly thwart one's proximal goals (e.g., to overcome disease). These robust effects are difficult to explain from the alternative viewpoint that nonspecific structure is merely a roundabout means of bolstering personal agency.

Nevertheless, cognitions about agency and structure are likely to interact. We propose that structure can serve as an affordance for agency. Sensing that their environment is structured, people are likely to mobilize efforts to exploit that structure to achieve their goals, which in turn prompts them to recruit cognitions about their personal skills, talents, and other resources. In short, personal control requires both agency and structured knowledge of the world; hence, control reduction instigates efforts to bolster structure even when levels of personal agency are held constant. Still, strengthening perceived structure rouses the acting agent to take advantage of that structure and pursue goals. We believe that this account, although speculative at this stage, can profitably guide future research on the interplay of compensatory control strategies.

Structure's Relation to Goal-Directed Action

We maintain that structure, like beliefs in personal control, enables people to effectively and confidently navigate their social and physical environments in pursuit of their goals, and for this reason the two can act interchangeably in affording action. How does structure seeking provide a context for action? For one, it involves identifying regularities in the features and properties of stimuli in the environment. This enables people to point, place, class, and manipulate stimuli with sure mastery. They can determine what kind of reaction they are to expect from stimuli and how they can best orient their action with relation to them. Structure seeking also involves identifying regularities in the unfolding of events. This allows people to predict the consequences of action for a given range of objects and anticipate the probable consequences of events before they occur. If this structure is lacking—that is, if environmental stimuli appear poorly defined and difficult to class or place into dependable cause-and-effect sequences—then the person loses the possibility of undertaking confident action. Indeed, recent research by Tullett, Kay, and Inzlicht (2014) has demonstrated the specific importance of predictability in the allure of structure. In these studies, while reminders of order, compared with randomness, led to decreased self-reported anxiety as well as lessened attention directed toward performance monitoring (as measured by event-related brain potentials), this effect was muted when the order described was incomprehensible (at least to lay humans). In other words, order may be primarily attractive to people because of its consequences for navigating the environment.

Maintaining perceptions of a structured (and thereby predictable and understandable) world, therefore, may facilitate the pursuit of long-term goals. Supporting this claim, recent studies have gone beyond perceived personal control to show that affirming nonspecific structure increases behavioral outcomes associated with buttressed control. Kay, Laurin, Fitzsimons, and Landau (2014) showed that participants exposed to subtle reminders of orderly patterns in the natural environment reported a greater willingness to engage in motivated action, and they were more likely to take specific, concrete action in pursuit of their goals. In two illustrative studies, participants assigned to the structure-boost condition received information that the placement of leaves on trees, or of stars in the night sky, follow an orderly pattern rather than emerge randomly. They were subsequently more willing to engage in planned, effortful behavior than those in comparison conditions, despite the fact that their goals bore no superficial relation to trees and the night sky. Furthermore, structure primes promoted goal-directed behavior particularly for individuals who, by disposition, lacked confident beliefs in their own ability to exert control over their environment. That is, the effects of activating thoughts of basic structure on goal-directed action were useful primarily for those who tend to suffer from low confidence in the contingent relationship between their actions and outcomes.

Our perspective, therefore, converges with several other recent models of threat and compensation that suggest compensatory processes are functional, especially insofar as they can inform, fuel, or otherwise facilitate goal-directed action. Much like, for example, resolving cognitive inconsistencies—and muting dissonance—affords commitment to a chosen course of action that is ultimately functional for survival (Harmon-Jones, Amodio, & Harmon-Jones, 2009), perceiving structure when feelings of control are tenuous can help provide people the necessary set of very basic beliefs required for moving forward with long-term goal pursuit. Some of these models focus on downregulating the emotions and negative affect that can prevent commitment to action, others focus on the epistemic beliefs that are needed to facilitate action, and still others combine both these approaches (e.g., Harmon-Jones et al., 2009; Heine et al., 2006; Proulx et al., 2012; Kay et al., 2008; Landau et al., 2012; M. J. Lerner, 1980; McGregor, Nash, Mann, & Phillips, 2010). Across all of this work, we are starting to gain a more holistic picture of how threats to motives—whether they be structure, control, or self-consistency—are experienced affectively, manifest cognitively, and ultimately impact goal-directed action (Jonas et al., 2014).

Practical Implications

Our overall conclusion is that construing the world as a structured place is a unique psychological strategy that people use to compensate for low or reduced personal control. Does use of this strategy benefit the person or society? There is no simple answer to this question. On the one hand, many of the findings we reviewed show, or strongly imply, that nonspecific structure affirmation promotes personal and collective well-being. For example, affirming structure maintains or elevates perceptions of control, which we know from prior research foster psychological and physical health (Tangney et al., 2004). We also saw that even incidental inductions of epistemic structure empower people to

take concrete steps to achieving their goals (Kay, Laurin, et al., 2014).

On the other hand, structure seeking, and the corresponding aversion to randomness and disorder, can have maladaptive consequences. Within the health domain, for example, individuals craving structure might endorse conceptions of disease merely on the basis of their apparent simplicity and order, and likewise dismiss potentially useful medical information because it acknowledges randomness (Rutjens et al., 2010; Rutjens et al., 2013). That is, people's reluctance to adopt or even consider a given perspective on their health may stem from a sense, even unconscious, that they lack control in their lives. In fact, based on the reviewed research, we would expect this effect to occur even when the sense of low control derives from a domain of experience that is unrelated to the health context at hand (e.g., one's romantic relationships). It has also been demonstrated that orderly (compared with disorderly) environments are negatively associated with creativity and interest in novelty (Vohs, Redden, & Rahinel, 2013). Thus, to the extent compensatory control motives lead people to seek out and prefer orderly, structured environments, it may come at the cost of innovation.

Other practical implications surround the evidence that control reduction increases the tendency to objectify other people, reducing them from unique individuals with rich subjective lives to simple, concrete attributes, such as their body parts. This suggests that individuals who feel chronically insecure in their ability to effectively influence others, or who suffer situational blows to their control in the interpersonal realm, may compensate through immersion in media worlds composed of objectified simulacra of social life. For example, they may be increasingly drawn to pornography, which typically depicts participants as mere objects and reinforces highly stereotyped portrayals of sexual encounters. Control reduction may similarly increase the appeal of immersive video games (e.g., *World of Warcraft*), which reduce the social world to exceedingly narrow dimensions that afford well-defined, concrete opportunities to act effectively. The broader implication is that, in their attempt to compensate for low or reduced control, people may deprive themselves of real-world intimate social relationships, which we know are integral for coping with stress (Uchino, 2004) and generally maintaining healthy psychological functioning (Cohen & McKay, 1984).

A related implication concerns the consequences for the targets of objectification. A large body of research has shown that sexually objectifying experiences (e.g., having body parts leered at, encountering media that spotlight women's bodies) coax women into taking an external vantage point on their physical experience, and this state of self-objectification generates shame, usurps mental energy, and contributes to depression, sexual dysfunction, and eating disorders (Moradi & Huang, 2008; Quinn, Chaudoir, & Kallen, 2011; Tiggemann, 2011).

The literature reviewed also carries implications for politics and intergroup relations. At a collective level, control reduction can drive groups to search for enemies and scapegoats to make sense of apparently chaotic negative outcomes, which in turn can distract the group from its own responsibility for those outcomes. Also, if political leaders sense (or manufacture) the feeling among the populace that control is lacking, they might exploit that insecurity to rally support for aggressive military action against an enemy

figure, particularly if they portray that enemy in simplified terms as the all-encompassing focal point for evil and chaos.

More generally, the literature reviewed helps to explain why people often prefer solutions to complex societal problems that focus on a single person or group viewed as the sole cause of those problems. For example, believing the unrest in the Middle East generally (or Iraq, specifically) was due to one obvious source—Saddam Hussein—rather than a complex web of historical, cultural, and geographic elements, may have been much easier to sell to the populace (and other politicians), but also more likely to cascade into doomed or futile attempts at intervention. Likewise, consider polling on Americans' attitudes toward solutions to terrorism. According to a 2006 national Gallup poll (Carroll, 2006), Americans believed that capturing or killing Osama Bin Laden should have been a higher priority in combating terrorism than attempting to improve communication between Middle Eastern countries and the United States, establishing a stable democratic government in Iraq, or resolving the conflict between Israel and Arab nations. The U.S. government responded to the public's priorities by making the apprehension of Bin Laden a top priority (Obama, 2011). Although apprehending Bin Laden may have been one part of a solution to the problem of terrorism, an overly narrow preoccupation with Bin Laden as the wellspring of evil may have resulted in inadequate attention paid to other, more complex dimension of the problem.

Public discourse surrounding important social and political issues is often dominated by extreme, polarizing perspectives, and this can lead political parties to become mired in ideological gridlock and policy stagnation. The research reviewed has suggested that this dynamic stems, at least in part, from people's motivation to embrace simplistic conceptions of reality as a means of assuaging deep-seated concerns about personal control. Compensatory control processes may lead people to diminish the complexity of a contentious issue, narrowing it into a reductive caricature rather than opening up a thoughtful debate that acknowledges the complex interplay of many factors. This can impede constructive policy making.

Finally, to the extent people crave simplicity in their social and political systems, there may also be a strong link between control needs and system justification (Jost & Banaji, 1994). One compelling way to see the world as structured is to view aspects of the system—such as social stratification, inequality, and penal practices—as intentional parts of the system's plan or natural and necessary outcomes of a dominant ideology (e.g., capitalism), rather than as unwanted and unforeseen byproducts of unpredictable forces. This version of the naturalistic fallacy—whereby the inherently good state of society is understood reductively in terms of the current system—might lead people see the system as beyond reproach. Consistent with this, not only has research revealed a causal link between control reduction and support and preference for sociopolitical systems (Kay et al., 2008), it has also shown that control reduction makes people more willing to acquiesce control to a range of sources of authority (Fennis & Aarts, 2012). One downstream consequence is that individuals struggling with concerns over personal control may be especially likely to view people (including themselves) who are disadvantaged by the system as responsible for their own suffering.

A related, more disturbing, implication is that control concerns can fuel attraction to extremist groups. Richardson (2006) ex-

plained how rapid political, social, and economic changes resulting from modernization foster instability by negating traditional conceptions of reality. These factors make it more likely that people create and identify with extremist ideologies that provide simple worldviews, including black-and-white conceptions of moral good and evil. Richardson reviewed supporting observational evidence that extremist activity often occurs in situations marked by political disorder and ideological instability.

Given that compensatory control processes can fuel maladaptive forms of nonspecific structure affirmation, it is worth briefly considering factors that can ameliorate these more extreme and maladaptive consequences. One approach is to encourage people to employ other compensatory strategies in such a way that satisfies their control motivation, curbing unnecessarily rigid desire for structured views of reality. In this regard, it is worthwhile to expand on the research that has shown that certain individual, situational, and cultural affordances moderate the employment of particular compensatory strategies. For instance, educational programs that strengthen and expand people's behavioral repertoires (i.e., equipping them with new skills) might orient them to bolster personal agency rather than pursue structure.

Another approach is to direct structure affirmation tendencies in productive directions. In other words, people can be encouraged to satiate their control motivation by zealously pursuing socially constructive forms of well-structured knowledge, such as by deciphering new patterns in health data or resolving inconsistencies in the law.

Conclusion

The theoretical and empirical background to the current presentation is work showing that, when people confront circumstances that diminish their perceived personal control, they employ various compensatory strategies to restore control or, at minimum, to assuage the aversive experience of diminished control. Our goal was to show, on the basis of emerging lines of research, that the affirmation of nonspecific epistemic structure is another common strategy—one that has not yet been formally recognized, yet carries significant theoretical and practical implications. To accomplish this, we made the following four claims.

1. Control reduction has an empirically robust effect on diverse cognitive structuring tendencies.

We reviewed experimental and correlational evidence that control-reducing events and cognitions heighten engagement with simple, clear, and consistent interpretations of the social and physical environments, even when those interpretations do not bear an obvious relation to the control-reducing conditions. Identifying this phenomenon brings order to what were previously disparate empirical findings dispersed across different areas of psychology.

2. Formalizing this phenomenon reveals new insights into the nature of control motivation.

The findings reviewed cannot be adequately described from the point of view of traditional theoretical accounts that emphasize the compensatory control function of bolstered personal or external agency, or action–outcome contingencies within the context of

control reduction. Taken together, they support the claim that nonspecific structure affirmation is a psychologically distinct means of compensating for reduced control. At the same time, it relates to the other three strategies in interesting ways, many of which merit further study.

- Perspectives on threat-compensation mechanisms yield testable hypotheses about when, why, and for whom control reduction will instigate compensatory structure seeking.

Some of these hypotheses follow from empirical generalizations across these perspectives. It has been widely shown, for instance, that compensating for a given threat through one means reduces the need for subsequent compensation by another means. Other hypotheses follow more specifically from CCT. For example, the theory posits that multiple sources of control—individual agency, external agents acting on the self's behalf, and basic order—can substitute for one another. From there, we can predict that the effect of control reduction on compensatory structure affirmation will be attenuated if people have chronic or situationally salient access to a benevolent external power, such as an interventionist god or a well-functioning government. We reviewed studies that support these hypotheses and organized them around four theoretically specified moderators.

- Recognizing this phenomenon enhances our understanding of the cognitive processes studied in social cognition.

Thousands of studies have revealed the various processes by which people simplify, disambiguate, and in general impose structure on the vast quantity of information about the people, events, and other stimuli they encounter in their social environment. For example, people rely on simple schemas (e.g., stereotypes) and mental heuristics to make rapid inferences and judgments. Social psychology's traditional explanation of these tendencies, consistently characterized in influential overviews of social cognition (e.g., S. T. Fiske & Taylor, 1991; Hamilton, 2005; Kunda, 1999; Moskowitz, 2005), presumes that people have a limited store of attentional resources; hence, they conserve mental energy by settling for simple, clear-cut interpretations of social information.

According to this view, people's preference for structured knowledge is essentially passive: they simply lack the mental energy to think deeply about their surroundings. This view is not exactly wrong. But it has always had an uneasy relationship with the empirical evidence of structure-seeking and structure-generating tendencies—that is, with people's active and opportunistic efforts to transform data from the social and physical environments into meaningful patterns. An adequate and illuminating account of social information processing requires that we rethink the core psychological motives behind meaning construction. One important motive, we hope to have shown, is the profound need to perceive the self as having control.

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