Threat and Defense as Goal Regulation: From Implicit Goal Conflict to Anxious Uncertainty, Reactive Approach Motivation, and Ideological Extremism

Kyle Nash and Ian McGregor
York University

Mike Prentice
University of Missouri–Columbia

Four studies investigated a goal regulation view of anxious uncertainty threat (Gray & McNaughton, 2000) and ideological defense. Participants ($N = 444$) were randomly assigned to have achievement or relationship goals implicitly primed. The implicit goal primes were followed by randomly assigned achievement or relationship threats that have reliably caused generalized, reactive approach motivation and ideological defense in past research. The threats caused anxious uncertainty (Study 1), reactive approach motivation (Studies 2 and 3), and reactive ideological conviction (Study 4) only when threat-relevant goals had first been primed, but not when threat-irrelevant goals had first been primed. Reactive ideological conviction (Study 4) was eliminated if participants were given an opportunity to attribute their anxiety to a mundane source. Results support a goal regulation view of anxious uncertainty, threat, and defense with potential for integrating theories of defensive compensation.

Keywords: implicit goal, threat, goal conflict, approach motivation, conviction

Kurt Lewin (1935) famously observed that toddlers handle goal frustration poorly. Goal conflicts, particularly approach–avoidance conflicts, caused his toddlers to become anxious and obdurate and to throw tantrums. Pavlov (1927) similarly noted that approach–avoidance conflicts caused his dogs to exhibit distress, erratic barking, and displaced aggression. A review of hundreds of animal studies, Gray and McNaughton (2000) identified goal conflict as the root cause of anxiety. We propose that the same dynamics that cause animal anxiety and toddler tantrums also cause adults to be generally disinhibited and extreme, though in a more ideological than physical way. We propose that adults become reactively extreme because doing so activates approach-motivated states that shield them from the anxious uncertainty aroused by goal conflicts.

In four studies we implicitly primed young adults' achievement or relationship goals and then randomly assigned them to think about threatening circumstances that either conflicted with or did not conflict with the implicitly primed goals. These threatening circumstances were the same ones that have reliably caused various kinds of extremes in dozens of experiments in our own laboratory (e.g., zeal for personal goals, compensatory conviction about ideological opin-

ions, exaggerated intergroup bias, and religious extremism; reviewed in McGregor, Nash, & Prentice, 2010). We predicted that participants would experience anxious uncertainty and become reactively approach motivated and ideologically belligerent only in the goal conflict conditions.

Goal Threats and Anxiety

Hundreds of studies have demonstrated that threatening experiences such as dissonance, personal uncertainty, failure, insecurity, and mortality salience cause self-serving, aggressive, and ideological reactions (see McGregor, 2006). These and other aversive experiences in the threat and defense literature have also been shown, either directly or indirectly, to cause anxiety. For example, failure, negative feedback, unfavorable social comparison, and anticipation of public evaluation have all caused anxiety-related physiological changes (Arndt & Goldenberg, 2002). Cognitive dissonance, mortality salience, social rejection, and meaning threats have caused brain activity indicative of anxiety (Eisenberger, Lieberman, & Williams, 2003; Quirin et al., 2011; van den Bos et al., 2008; van Veen, Krug, Schooler, & Carter, 2009). Uncertainty and meaning threats induce self-reports of distress akin to anxiety (McGregor, Zanna, Holmes, & Spencer, 2001; Proulx & Heine, 2010). Defensive reactions to some of these threats can also be eliminated if participants are given opportunity to neutralize the potential for, or misattribute, the experience of anxious arousal (Greenberg, Solomon, & Pyszczynski, 2003; Kay, Moscovitch, & Laurin, 2010; Proulx & Heine, 2008; Tesser, Pilkington, & McIntosh, 1989; Zanna & Cooper, 1974). Drawing on neuroscientific research revealing basic links between goal conflict and anxiety (Gray & McNaughton, 2000), our four studies here test the hypothesis that threats cause anxious arousal and defensive reactions only if those threats conflict with active goals.

Reactive Approach Motivation (RAM)

According to Gray and McNaughton (2000), vertebrates evolved a neural module—the behavioral inhibition system (BIS)—to cope with goal conflict. For example, an eagerly foraging mouse that smells a cat faces the conflict of wanting to continue approaching food but also avoiding the nearby predator. Upon detecting this conflict, the BIS inhibits the original goal and arouses a vigilant state of anxious uncertainty. Gray and McNaughton reviewed hundreds of lesion, neurophysiological, and pharmacological studies supporting their claim that the neuropsychology of anxiety hinges on the uncertain predicament of goal conflict. This anxious uncertainty motivates a scanning of the environment for a more tenable, alternative goal to approach. The alternative goal may be *equifinal* (Kruglanski et al., 2002); that is, it may be an alternative route for resumption of the conflicted goal (e.g., foraging away from the cat).

BIS function is also conducive, however, to disengagement from the focal goal in favor of any alternative tenable goal, even if unrelated to the initial conflict. Any appealing goal that could be approached without impedance would be rewarding in the face of goal conflict because it would restore motivational clarity and relieve the anxious uncertainty of the BIS. Once the animal disengages from the conflicted goal to engage the more tenable alternative, the resumption of unconflicted approach motivation relieves BIS-mediated anxiety (Corr, 2008; Nash, Inzlicht, & McGregor, 2011).

This palliative view of approach motivation is supported by two related sets of empirical findings. First, approach motivation narrows attention to goal-related stimuli and shields from potentially diverting stimuli (P. A. Gable & Harmon-Jones, 2008; E. Harmon-Jones & Gable, 2009; Higgins, 1997; Shah, Friedman, & Kruglanski, 2002). Second, brain activity associated with approach motivation (Amodio, Master, Yee, & Taylor, 2008; Coan & Allen, 2003; Davidson, 1998; Davidson, Pizzagalli, Nitschke, & Kalin, 2003; E. Harmon-Jones & Allen, 1998) predicts diminished behavioral and neural reactivity to anxiety-inducing events (Jackson et al., 2003; Nash et al., 2011).

Our key assumption is that ideals and ideologies are abstract goals. Prevailing models of goal regulation position ideals as superordinate goals that guide more concrete, subordinate goals (Carver & Scheier, 1998; Higgins, 1997; Vallacher & Wegner, 1987). Ideals are also associated with approach-motivation-related brain activity (Amodio, Shah, Sigelman, Brazy, & Harmon-Jones, 2004). Accordingly, eagerly throwing oneself into one's ideals should be an effective way to activate approach-motivation-related processes and relieve the anxious uncertainty of the BIS.

We have found initial evidence for this kind of RAM after various threats, and we have shown that RAM fuels ideological extremes (McGregor, Gailliot, Vasquez, & Nash, 2007; McGregor, Nash, & Inzlicht, 2009; McGregor, Nash, Mann, & Phills, 2010; McGregor, Nash, & Prentice, 2010). For example, we have focused on threats that conflict with university participants' achievement goals (i.e., academic uncertainty) or relationship goals (i.e., relationship troubles). These threats, which have caused ideological extremes in over 10 published studies, also caused RAM on self-report, implicitly assessed, behavioral, and electroencephalographic measures (McGregor et al., 2009; McGregor, Nash, et al., 2010; Nash, McGregor, & Inzlicht, 2010). In two of these studies, threat-caused RAM was moderated and mediated by idealism

(McGregor, Nash, et al., 2010, Studies 3 and 4). Finally, dispositional evidence also shows that such ideological and RAM reactions are most pronounced among individuals with high scores on approach-motivation personality traits (i.e., high self-esteem, behavioral approach system drive, promotion focus, and action control; McGregor et al., 2007, 2009; McGregor, Nash, & Prentice, 2010; see also C. Harmon-Jones, Schmeichel, Inzlicht, & Harmon-Jones, 2011).

The above research shows that threats—particularly threats to important goals—can cause anxiety, RAM, and ideological extremes. The present research attempts to consolidate these findings and tests a goal conflict hypothesis about the origin of anxious uncertainty, RAM, and ideological defense in humans. We implicitly primed achievement or relationship goals and then manipulated achievement or relationship threats that have caused RAM and ideological extremes in previous research. Our past research suggests that in the absence of goal primes, threatening circumstances that undermine academic or relationship goals cause at least some participants to shift toward RAM and ideological extremes. We suspect that these kinds of main effects arise because, even without goal primes, some undergraduate participants will always have ambient academic or relationship goals active. The current research hones the goal conflict interpretation of these past findings by experimentally manipulating implicit goal focus before the threat manipulations. We predicted that if participants are primed with a threat-irrelevant goal, then the threat-irrelevant goal will shield them from concern with the subsequently manipulated threat (Shah et al., 2002) and render the threat inert. Research by Gable and Harmon-Jones (P. A. Gable & Harmon-Jones, 2008; E. Harmon-Jones & Gable, 2009) has found that active goals constrict motivational attention to goal-relevant stimuli. Shah et al. (2002) similarly found that active goals suppress the salience of stimuli related to inactive goals. Accordingly, threats that are irrelevant to previously primed, active goals should also be muted. In contrast, if participants are primed with a goal that is threat relevant, then the threat will cause anxious uncertainty, RAM, and ideological defense.

Overview

Four experiments test whether achievement and relationship threats that have reliably caused self-serving and ideological reactions in dozens of previous experiments will do so when they conflict with active goals, but not when they are shielded by active goals. In each study we randomly assigned participants to receive primes known to activate implicit relationship or achievement goals (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001). Studies 1 and 2 tested the prediction that achievement and relationship threats would then cause anxious uncertainty and RAM when preceded by domain-relevant goal primes, but not when preceded by domain-irrelevant goal shield primes. Study 3 assessed a behavioral measure of RAM after implicitly primed goal conflict. Finally, Study 4 tested whether ideological extremes caused by implicitly primed goal conflict would be mediated by anxious uncertainty. The four studies thus comprehensively assess whether goal conflict might be the precise kind of threat that causes anxious uncertainty, RAM, and ideological extremism.

Study 1

As noted above, anxious uncertainty is the specific negative emotion linked to BIS activation after goal frustration (Gray & McNaughton, 2000), but direct evidence for the role of anxiety has been difficult to come by in threat and defense research, presumably because defenses can effectively mask the eliciting anxiety. Indeed, anxiety-provoking threats cause an immediate period of threat suppression, during which there is no evidence of anxiety. After a delay, however, anxious thoughts rebound into hyperaccessibility (Arndt, Greenberg, Solomon, Pyszczynski, & Simon, 1997; Wichman, Brunner, & Weary, 2008; see also Wenzlaff & Wegner, 2000). Thus, one would not expect threatened individuals to accurately report anxious emotions immediately after threats. In Study 1 we therefore measured BIS-related emotions and other negative affects after a postthreat delay to bypass the suppression period. We used a 2 (goal prime: achievement prime vs. relationship prime) × 2 (threat: achievement threat vs. relationship threat) design and hypothesized that only participants first primed with a goal relevant to the subsequent threat would specifically report feelings of anxious uncertainty.

Method

Participants and procedure. One hundred and five undergraduates (63 female, 42 male; mean age = 19.7 years) participated in exchange for partial credit in their introductory psychology course. Two participants were excluded from analyses for completing some of the same materials in prior research, leaving 103 participants (62 female, 41 male). Data were collected online in a single session.

Goal primes. We randomly assigned participants to complete either an achievement prime or a relationship prime, both of which have activated goal-related behavior in past research (Bargh et al., 2001; Fitzsimons & Shah, 2008). We used the scrambled-sentence task in which participants are instructed to make reasonable four-word sentences out of five scrambled words for 16 sets. In each condition, eight of the 16 sets of words have embedded words relating to the goal domain. The achievement goal prime sentences contain the words *succeed*, *attain*, *strive*, *master*, *excellence*, *ambition*, *achieved*, and *accomplished*. The relationship goal prime sentences contain the words *include*, *loved*, *belonged*, *acceptance*, *caring*, *supported*, *liked*, and *affection*.

Threat conditions. We then randomly assigned participants to either an achievement threat or a relationship threat condition. Participants in the achievement threat condition were informed that on the next computer screen they would read about a popular statistics method for analyzing data and that we wished to see how understandable it was to them. After a 2-min period in which they read an incomprehensible statistics passage, participants were then given 2 min to summarize what they had read. Our assumption that this threat conflicts with achievement goals held by undergraduate psychology students is supported by past research showing it to cause feelings of uncertainty and frustration (McGregor, Haji, Nash, & Teper, 2008) and reliably cause self-serving and worldview extreme reactions (McGregor, Nail, Marigold, & Kang, 2005; McGregor, Nash, & Prentice, 2010).

Participants in the relationship threat condition were first required to think about and identify "a close relationship (family member, friend, or romantic partner) that is currently not going very well." They then answered two questions: "Describe the kinds of problems and difficulties you are having with this person" and "Describe your thoughts and feelings regarding the possibility of this relationship continuing to go poorly or perhaps even getting worse." Each question was presented on a separate screen with instruction to spend 2 min on each. This relationship threat has also reliably caused self-serving and worldview extreme reactions (e.g., McGregor & Marigold, 2003; McGregor, Nash, & Prentice, 2010).

Delay period. Participants completed 10 min of filler tasks before we assessed the negative affect items. Although a 3-min delay has been enough time to allow for defenses to emerge in past research, the precise time course of defense is still unknown. Thus, a 10-min delay ensured ample time for the proximal suppression to subside and for threatening thoughts to once again become accessible (Arndt et al., 1997; Wichman et al., 2008).

Threat experience questionnaire. After the delay period, participants reported how completing the achievement or relationship threat materials made them feel on a range of positive and negative adjectives (from 1 = *not at all* to 5 = *extremely*). The adjectives *anxious*, *uncertain*, and *frustrated* are specifically related to BIS activation (Gray & McNaughton, 2000). The other adjectives included *good*, *happy*, *smart*, *successful*, *likeable*, *meaningful*, *confused*, *empty*, *ashamed*, *insecure*, *lonely*, *stupid*, and *out of control*.

Results and Discussion

Each threat experience item was separately entered into a 2 (goal prime: achievement prime vs. relationship prime) × 2 (threat: achievement threat vs. relationship threat) between-subjects analysis of variance (ANOVA). An interaction effect emerged on three items only: anxious, $F(1, 99) = 9.32$, $p = .003$, $\eta_p^2 = .09$; uncertain, $F(1, 99) = 14.70$, $p < .001$, $\eta_p^2 = .13$; and frustrated, but only marginally, $F(1, 99) = 3.23$, $p = .08$, $\eta_p^2 = .03$. All other items demonstrated nonsignificant interaction effects (all ps > .18). These emotions related to BIS activation—anxious, uncertain, and frustrated—demonstrated an acceptable reliability coefficient (Cronbach's $\alpha = .75$) and were thus combined in a composite score of BIS emotion. This composite was entered into the same 2 × 2 ANOVA, and an interaction effect again emerged, $F(1, 99) = 12.68$, $p = .001$, $\eta_p^2 = .11$ (see Figure 1).

Planned comparisons for the BIS emotion score revealed that participants in the achievement prime–achievement threat condition reported more BIS emotion ($M = 2.54$, $SD = 1.12$) than those in the achievement prime–relationship threat condition ($M = 1.96$, $SD = 0.87$), $F(1, 99) = 4.20$, $p < .05$, $\eta_p^2 = .04$, and also more than participants in the relationship prime–achievement threat condition ($M = 1.95$, $SD = 0.85$), $F(1, 99) = 4.73$, $p < .05$, $\eta_p^2 = .05$. Conversely, participants in the relationship prime–relationship threat condition reported feeling more BIS emotion ($M = 2.73$, $SD = 1.02$) than participants in the relationship prime–achievement threat condition ($M = 1.95$, $SD = 0.85$), $F(1, 99) = 8.60$, $p < .01$, $\eta_p^2 = .08$, and also more BIS emotion than participants in the achievement prime–relationship threat condition ($M = 1.96$, $SD = 0.87$), $F(1, 99) = 8.20$, $p < .01$, $\eta_p^2 = .08$.

These results demonstrate that participants who faced a goal-relevant threat (e.g., achievement prime–achievement threat) felt heightened BIS emotions of anxiety, uncertainty, and frustration
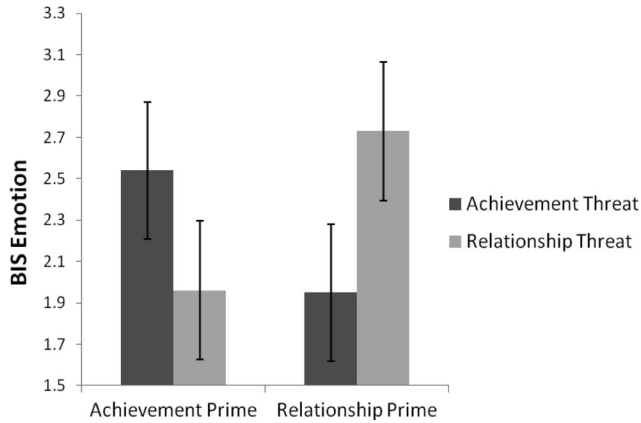
Figure 1. Behavioral inhibition system (BIS) emotion as a function of goal prime and threat in Study 1. Error bars indicate standard errors.

(Gray & McNaughton, 2000) compared with those who faced a goal-irrelevant threat (e.g., achievement prime–relationship threat). These goal priming and BIS emotion findings support the hypothesis that threats can conflict with active goals and that goal primes may even shield from irrelevant threats. In Study 2 we tested whether the same combinations of goal primes and relevant threats would also cause RAM.

Study 2

The design in this study was a 2 (goal prime: achievement prime vs. relationship prime) $\times$ 3 (threat: achievement threat vs. relationship threat vs. no-threat control) ANOVA. The RAM dependent variable was a measure of relative approach motivation in participants' daily goals. We predicted that RAM would result when threats conflicted with a relevant goal prime—the same conditions that caused anxious uncertainty in Study 1.

Method

Participants and procedure. One hundred and twenty-five undergraduates (105 female, 20 male) participated in exchange for partial credit in their introductory psychology course. Four participants incorrectly completed the materials, and one had completed some of the same materials in prior research, leaving 120 participants (101 female, 19 male) for analyses. A male and a female research assistant collected the data in groups of up to 12 participants at a time. Each participant completed his or her package of computerized and paper materials in a private cubicle.

Goal primes. We randomly assigned participants to complete either an achievement-themed or a relationship-themed word-search puzzle. These puzzles consist of a 10 × 10 matrix of letters in which have half the embedded words relate to a goal construct (e.g., the achievement puzzle contained the words *achieve, attain, compete, master, strive, succeed,* and *win,* whereas the relationship puzzle contained the words *accepted, affection, caring, included, liked, loved,* and *supported*) and have been found to be effective goal primes (Bargh et al., 2001).

Threat and control conditions. Participants were then randomly assigned to one of three conditions: the achievement threat or

the relationship threat conditions from Study 1 or a mundane no-threat control task. The no-threat control condition required participants to spend 2 min summarizing a very simple passage about the benefits of statistics that has been used as a control condition for the statistics threat in past research (McGregor et al., 2009).

Delay period. The 3-min delay in this study instructed participants to let their minds wander and record the topics that came to mind. After 3 min, the computer screen advanced to the next task. Three minutes of delay before introducing dependent measures has been sufficient to allow for RAM and defensive extremes to emerge (McGregor, Nash, et al., 2010; McGregor, Nash, & Prentice, 2010).

Relative approach motivation. Following the delay period, participants were instructed to nominate four goals "that are the most characteristic of you" and then rated those goals (from 1 = *not at all* to 7 = *extremely*) on four dimensions related to approach and avoidance motivation. The goals that participants nominated were almost exclusively important life goals, such as "get good grades," "make lots of money," and "make new friends." The two approach dimensions were Approach 1, "To what extent does this project focus on promoting good things that you have high hopes for?" and Approach 2, "To what extent does this project feel like something that you truly and ideally WANT to be doing (regardless of what you feel that you should be doing)?" The two avoidance dimension were Avoidance 1, "To what extent does this project focus on preventing bad things from happening?" and Avoidance 2, "To what extent does this project feel like something that you SHOULD be doing (regardless of what you would ideally like to be doing)?" Positive ideals and outcomes reflect core features of an approach-motivation mindset and have been related to approach patterns of brain activity, whereas oughts and obligations reflect an avoidance motivation mindset and have been related to avoidance patterns of brain activity (Amodio et al., 2004; Higgins, 1997).

The approach and avoidance scores were correlated ($r = .47$, $p < .001$), presumably because they both relate to general motivation for important life goals. For example, a highly motivated student would presumably want to "get all As" (approach) and "not get any Bs" (avoid). In two relevant studies, it has been found that approach-motivated and avoidance-motivated social goals can be strongly positively correlated, a relationship the author suggested reflected "the importance of the social domain in general" (S. L. Gable, 2006, p. 198). However, after partialing out this shared variance presumably associated with domain-general importance, approach-motivated goals predicted more positive social outcomes than avoidance-motivated goals (S. L. Gable, 2006). Thus, to index approach-related processes, the author needed to control for general motivation. Given that we also wished to index clear approach motivation, as motivationally ambiguous goals would be ineffective at quelling goal frustration, we computed a difference score by subtracting participants' average avoidance (from their eight scores: 2 dimensions × 4 goals) from their average approach (from their eight scores: 2 dimensions × 4 goals) and used the difference as the relative approach motivation dependent variable.

Results and Discussion

The personal project approach and avoidance indices had Cronbach's alpha reliability coefficients across their eight scores of .80 and .82, respectively.

To test the prediction that only those who faced a threat relevant to the goal prime would respond with RAM, we conducted a 2 (goal prime: achievement prime vs. relationship prime) × 3 (threat: achievement threat vs. relationship threat vs. no-threat control) between-subjects ANOVA with relative approach motivation as the dependent variable. The analysis yielded a significant Goal Prime × Threat interaction effect, $F(2, 114) = 7.76$, $p = .001$, $\eta_p^2 = .12$ (see Figure 2).

Planned comparisons across goal primes revealed higher levels of relative approach motivation in the achievement prime–achievement threat condition ($M = 1.30$, $SD = 1.13$) than the relationship prime–achievement threat condition ($M = 0.26$, $SD = 0.83$), $F(1, 114) = 13.32$, $p < .001$, $\eta_p^2 = .11$. Similarly, the relationship prime–relationship threat condition reported marginally higher levels of relative approach motivation ($M = 0.94$, $SD = 0.88$) than the achievement prime–relationship threat condition ($M = 0.38$, $SD = 0.76$), $F(1, 114) = 3.76$, $p < .06$, $\eta_p^2 = .03$.

Comparisons in each goal prime condition revealed higher levels of relative approach motivation in the achievement prime–achievement threat condition ($M = 1.30$, $SD = 1.13$) than in either the achievement prime–relationship threat condition ($M = 0.38$, $SD = 0.76$), $F(1, 114) = 10.30$, $p < .01$, $\eta_p^2 = .08$, or the achievement prime–no-threat control condition ($M = 0.52$, $SD = 0.95$), $F(1, 114) = 6.71$, $p = .01$, $\eta_p^2 = .06$. Further, there was higher relative approach motivation in the relationship prime–relationship threat condition ($M = 0.94$, $SD = 0.88$) than either the relationship prime–achievement threat condition ($M = 0.26$, $SD = 0.83$), $F(1, 114) = 5.52$, $p < .05$, $\eta_p^2 = .05$, or the relationship prime–no-threat control condition ($M = 0.36$, $SD = 0.87$), $F(1, 114) = 4.37$, $p < .05$, $\eta_p^2 = .04$.

These findings indicate that for those who were primed with a relationship goal, only the relationship threat caused RAM. Similarly, for those who were primed with an achievement goal, only the achievement threat caused RAM. However, if participants faced a threat that was irrelevant to their primed goal pursuit, they responded with lower levels of relative approach motivation, similar to the no-threat control conditions. The irrelevant goal primes effectively shielded them from the threats. These findings demonstrate that the same combinations of goal primes and threats that caused anxious uncertainty in Study 1 caused RAM in Study 2.
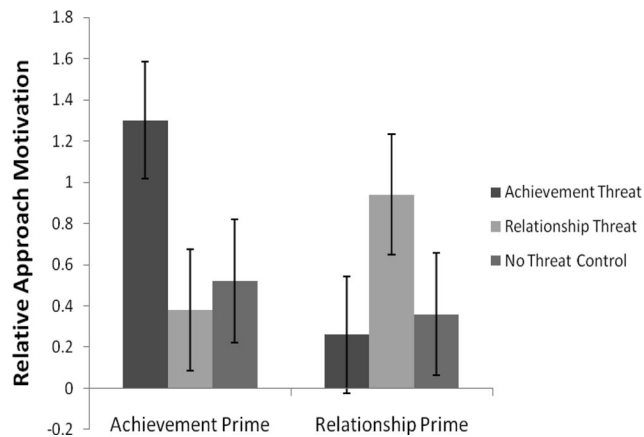

Figure 2. Relative approach motivation as a function of goal prime and threat in Study 2. Error bars indicate standard errors.

Study 3

The measure of RAM in Study 2 relied on participants' self-reports of the extent to which their personal goals in life were approach motivated. Study 3 assessed a behavioral index of approach motivation: the line bisection task (LBT). Although originally used by clinicians as a measure of hemispatial neglect, the LBT has become a widely used behavioral index of motivation. For example, action-related emotions, reward seeking, writing about cherished values, and approach-related electroencephalographic activity have all been related to a rightward line bisection bias (Drake & Myers, 2006; Förster, Liberman, & Kuschel, 2008; Friedman & Förster, 2005; Nash et al., 2010; Shrira & Martin, 2005). In a pretest we found the LBT index of approach motivation (i.e., rightward bias) to be significantly correlated with the personal project measure of RAM used in Study 2 ($r = .31$, $p = .005$).

In Study 3 we randomly assigned participants to prime and threat conditions in a 2 (goal prime: achievement prime vs. relationship prime) × 2 (threat: achievement threat vs. no-threat control) design and predicted that the same goal frustration conditions that caused anxious uncertainty and personal project RAM would increase the LBT index of RAM.

Method

Participants and procedure. Forty-nine undergraduates (32 female, 17 male) participated for course credit during a class break in a personality psychology course. Participants first completed a baseline measure of the LBT, then a randomly assigned achievement or relationship word-search goal prime, and then the randomly assigned achievement threat or control condition materials. They then waited until the slowest participant finished this threat section (modal wait time of 3 min) before the dependent measure of LBT was distributed and completed.

Goal primes. Participants randomly received either the achievement prime or relationship prime word-search tasks that were used in Study 2.

Achievement threat manipulation. After the goal prime, participants were randomly assigned to either the achievement threat or the no-threat control condition. Participants in the achievement threat first read the following passage:

> Think of an unresolved academic dilemma in your life. You are not yet sure whether to leave this school-related problem as it is, or take action in order to change things. You feel very uncertain, but haven't yet decided what to do. The problem should be complex and should take the form of "Should I make a change . . . or not?"

They then gave short written answers to the following prompts (adapted from Taylor & Gollwitzer, 1995, and McGregor et al., 2001):

- "Please briefly name your dilemma."
- "What personal value makes you want to make a change from the way things are right now?"
- "What personal value makes you want to not change anything, and leave things as they are right now?"
- "How does this dilemma make you feel?"
- "List any possible future consequences that could result if you opted for changing things."

• "List possible future consequences that could result if you left things the way they are and did not make a change."

The no-threat control condition had participants complete the same task, except it was about a friend's academic dilemma, with no bearing on their own goal conflicts. Immersion in personal academic uncertainty was expected to be an effective achievement goal conflict for undergraduate students. Past research demonstrated that a similar dilemma manipulation specifically caused anxious uncertainty and self-serving and worldview defenses (McGregor et al., 2001, Studies 1 and 2; McGregor et al., 2008, Study 2).

Delay period and dependent measure of LBT–approach motivation. The duration between the end of the achievement threat manipulation and the start of the LBT was approximately 3 min and served as the requisite delay period. The line bisection was measured twice, both before the threat materials and after the delay period. In each measure, participants were instructed to mark the perceived center point of 14 staggered horizontal lines presented on a landscape-view sheet of paper. The distance from each line's true midpoint was measured in millimeters, and leftward errors were scored as negative values. Mean baseline and post-threat LBT–approach motivation scores were calculated by averaging the errors across the 14 lines. Positive values, or a rightward bias, indicated relatively greater approach-related bisection bias.

Results and Discussion

The postthreat LBT–approach motivation score was entered in a factorial 2 (goal prime: achievement prime vs. relationship prime) × 2 (threat: achievement threat vs. no-threat control) analysis of covariance with the baseline LBT–approach motivation score entered as a covariate to reduce error variance. The results revealed a significant interaction effect, $F(1, 44) = 4.13$, $p < .05$, $\eta_p^2 = .09$ (see Figure 3). Planned comparisons revealed more LBT–approach motivation in the achievement prime–achievement threat condition ($M = 2.53$, $SD = 5.22$) than in either the achievement prime–no-threat control condition ($M = -1.85$, $SD = 6.39$), $F(1, 44) = 7.09$, $p = .01$, $\eta_p^2 = .14$, or the relationship prime–
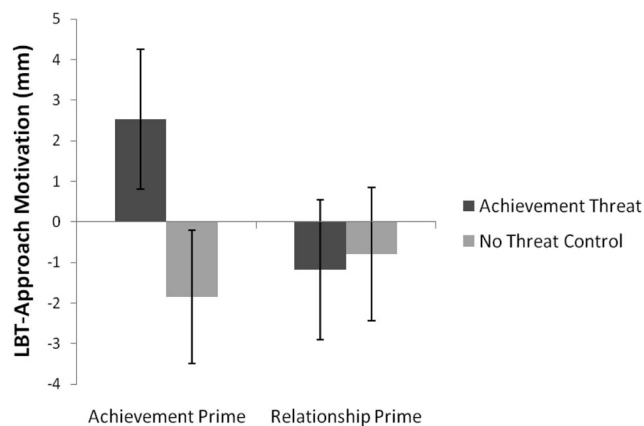

Figure 3. Approach motivation measured by millimeters of rightward bias in the line bisection task (LBT) as a function of goal prime and threat in Study 3. Error bars indicate standard errors.

achievement threat condition ($M = -1.18$, $SD = 5.96$), $F(1, 44) = 4.67$, $p < .05$, $\eta_p^2 = .10$.

In line with Study 2, only participants in the goal conflict condition demonstrated evidence of RAM, as measured by the LBT. Together, these findings converge in support of the goal conflict view of threat and RAM. Threats cause RAM to the extent that they disrupt goals. Building on past research showing links between RAM and defensive extremes, Study 4 tested whether the precise goal conflict conditions that predicted anxious uncertainty and RAM in Studies 1–3 would predict defensive extremes as well. Moreover, Study 4 completed the chain of causality from goal conflict to defensive extremes by testing the mediating role of anxiety.

Study 4

Studies 1–3 showed that the very same threatening circumstances that have caused anxiety, RAM, and ideological defenses in past research do so only when they undermine active goals. Anxiety has long been proposed as the emotional catalyst of various defensive reactions to threat (Freud, as cited in Gay, 1989; Hart, Shaver, & Goldenberg, 2005; Kay et al., 2010; Proulx & Heine, 2010; Vaillant, 1992), but as noted in Study 1, it has proven difficult to directly assess anxiety as a mediator of the relation between threat and defensive reactions. In Study 4 we bypassed this procedural difficulty by using the logic of experimental moderation to demonstrate mediation. Spencer, Zanna, and Fong (2005) demonstrated that statistical tests of mediation in experimental research can fail to demonstrate mediating mechanisms that do actually exist, due in part to lack of variability of the dependent variable in the control condition. They recommend manipulating the presumed mediator as a superior approach. In Study 4 we accordingly manipulated the mediator (anxiety) using a misattribution paradigm originally used to indirectly demonstrate the role of anxiety in defensive reactions to cognitive dissonance. We expected that goal conflict would cause reactive extremes only among participants not given the chance to misattribute their anxiety.

In a seminal study, Zanna and Cooper (1974) reasoned that if defensive reactions to dissonance were driven by an uncomfortable arousal, then participants able to "misattribute" that arousal to an external cause would not need to engage in normal dissonance reduction behavior. Their experiment involved having all participants ingest a pill prior to a typical dissonance manipulation. Some were randomly assigned to be given no information, and some were told the pill would cause tension. For those in the no-information condition, participants reacted to the high dissonance manipulation with defensive attitude change, replicating previous research. Importantly, among participants who could misattribute their tension to the pill, defensive attitude change was eliminated. Subsequent research has found that this misattribution of negative affect also eliminates defensive reactions to other psychological threats, such as unfavorable social comparison (Tesser et al., 1989), lack of personal control (Kay et al., 2010), and subtle expectancy violations (Proulx & Heine, 2008).

We used the same paradigm and experimentally manipulated whether participants would have a chance to misattribute their goal-conflict-induced anxiety to an external source. Participants first completed either an achievement or relationship goal prime,

and then everyone completed a relationship threat. Participants were then either given a chance to misattribute anxiety or had no such opportunity. We predicted that only in the relationship goal prime–no-misattribution condition would implicit goal conflict cause participants to claim more belligerent conviction about value-laden social issues. Participants able to misattribute their anxiety (i.e., relationship prime–misattribution condition) or primed with a threat-irrelevant goal (i.e., achievement prime conditions) were not expected to show the same heightened conviction.

Method

Participants and procedure. One hundred and seventy-two undergraduates (137 female, 35 male; mean age = 22.8 years) participated for course credit in a personality psychology course. Data were collected online in a single session.

Goal primes. We randomly assigned participants to complete either the achievement or relationship scrambled-sentence goal prime from Study 1.

Relationship threat. All participants then completed the relationship threat from Studies 1 and 2. This exact relationship threat, as compared with a neutral control condition, has caused ideological extremes in five of our previously published experiments (Marigold, McGregor, & Zanna, 2010; McGregor & Marigold, 2003; McGregor, Nash, et al., 2010; McGregor, Nash, & Prentice, 2010). Similar kinds of relationship threats have also caused ideological extremes in over a dozen other published experiments in our own and others' laboratories (Hart et al., 2005; Mikulincer, Florian, & Hirschberger, 2003). Given that the basic effect has already been amply demonstrated, we kept a more manageable design in the present experiment by threatening everyone and manipulating goal prime relevance and misattribution opportunity.

Misattribution conditions and delay period. After completing the relationship threat materials, participants were randomly assigned to either the misattribution or no-misattribution conditions. In the misattribution condition participants read the following instructions:

> At this point, we would like to point out that sometimes people feel uneasy or bothered by sending personality information over the Internet. If you feel uneasy, please note that this is a common feeling or side effect associated with Internet personality research.

They then continued on to the same delay period from Studies 1 and 2. Participants in the no-misattribution condition moved directly to the delay period task after the relationship threat.

Compensatory conviction. In previous research, both relationship- and achievement-related threats have caused heightened conviction for social issues, such as capital punishment (McGregor & Jordan, 2007; McGregor & Marigold, 2003; McGregor et al., 2001). We used conviction about the same issue as our dependent variable, to further connect this research to the threat and defense literature.

Participants read 15 statements about the use of capital punishment, ranging on a continuum from extreme opposition to extreme endorsement. They were instructed to select the belief that most closely reflected their own and then rate their level of conviction

across the following eight items on an 11-point scale (as in McGregor & Marigold, 2003, Study 2):

1. "How firmly do you believe in this position?"

2. "How willing would you be to defend this position in an argument?"

3. "How strong is your conviction about this position?"

4. "How certain do you feel about this position?"

5. "I find myself feeling 'torn' between the two sides of the issue of capital punishment; my feelings go in both directions only."

6. "My head and my heart seem to be in disagreement on the issue of capital punishment."

7. "I have strong mixed emotions both for and against capital punishment, all at the same time."

8. "My 'gut' feeling about capital punishment lines up perfectly with what my rational intellect tells me to do."

We created a composite score (with Items 5, 6, and 7 reverse scored) as our measure of conviction.

Results and Discussion

The eight items of the conviction scale demonstrated acceptable reliability (α = .85). We entered the conviction score into a 2 (goal prime: achievement prime vs. relationship prime) × 2 (misattribution: misattribution vs. no misattribution) between-subjects ANOVA. An interaction effect was revealed, $F(1, 168) = 5.76$, $p < .05$, $\eta_p^2 = .03$ (see Figure 4). Planned pairwise comparisons revealed that conviction was higher in the relationship prime–no-misattribution condition ($M = 6.95$, $SD = 1.84$) than in either the relationship prime–misattribution condition ($M = 6.17$, $SD = 1.63$), $F(1, 168) = 4.27$, $p < .05$, $\eta_p^2 = .03$, or the achievement prime–no-misattribution condition ($M = 6.16$, $SD = 1.84$), $F(1, 168) = 4.55$, $p < .05$, $\eta_p^2 = .03$.
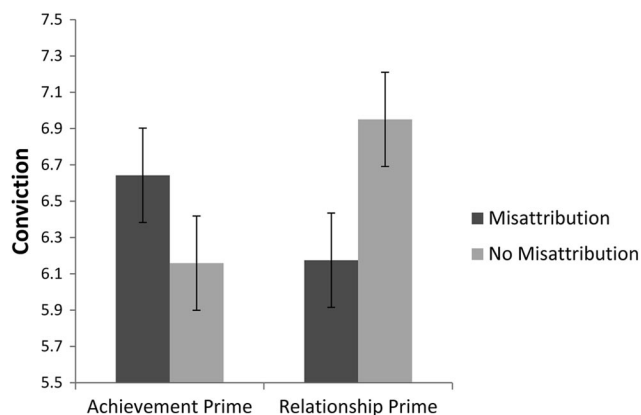

Figure 4. Conviction as a function of goal prime and misattribution after relationship threat in Study 4. Error bars indicate standard errors.

This study provides a final piece of evidence for the goal conflict view of threat and defense. In Study 1 implicitly primed goal conflict directly caused feelings of anxiety and uncertainty. In this study, relationship goal conflict caused ideological extremism only for participants in the no-misattribution condition. Participants able to misattribute their anxious feelings to an external source or who were primed with a threat-irrelevant goal (i.e., those shielded by the achievement prime) showed no defensive reaction. Thus, defensive reactions occur only after goal conflict and the resulting anxiety.

General Discussion

Four studies provide preliminary support for a goal regulation view of threat and defense. Participants experienced anxious uncertainty and reacted with RAM and defensive conviction for value-laden opinions only when threats were preceded by implicit goal primes relevant to the domain of the threat. In Study 1 achievement and relationship threats caused the precise kind of anxious arousal characteristic of goal conflict and BIS activation, but only when preceded by domain-relevant goal primes. In Study 2 the same goal conflict combinations of relevant goal primes and threats caused RAM for participants' idiosyncratic personal projects. Study 3 found that the same kind of goal conflict caused behavioral evidence of approach motivation. In Study 4 defensive conviction was heightened by the same goal conflict conditions, unless participants were given the chance to attribute their anxiety to a mundane, external source.

Past research has found that these same threats, and a variety of other threats, cause anxiety, RAM, and ideological extremes. Together with previously published RAM theory and research, the present results are consistent with the theoretically grounded speculation that threats cause anxious uncertainty, RAM, and ideological extremes only when they impose goal conflicts (see McGregor, Nash, & Prentice, 2010, for additional evidence that conflict-unrelated aversive experiences do not cause such extreme reactions).

Implicit Goal Regulation

The present results extend understanding of implicit goal pursuit. To our knowledge, these are the first studies that have investigated the consequences of both disrupted achievement and relationship goal pursuits. Previous research has focused on effects of disrupted achievement goals (Bongers, Dijksterhuis, & Spears, 2009). Moreover, these are the first studies to demonstrate that one of the consequences of disrupting goal pursuit is a compensatory reaction of generalized RAM. Previous research has demonstrated that motivation for a particular goal pursuit may increase over time and goal-related behavior tends to persist in the face of goal obstructions (Bargh et al., 2001). Implicit goal conflict itself has been found to cause negative affect (Chartrand & Bargh, 2002; Gray & McNaughton, 2000), lowered self-esteem (Bongers et al., 2009), diminished levels of goal accessibility, and decreased desirability for that goal (Aarts, Custers, & Holland, 2007). In addition to these prior findings, the present results indicate that implicit goal conflicts specifically cause anxious uncertainty, RAM, and defensive extremism.

Implicit Goal Shielding

The present results also suggest intriguing speculations about relatively simple ways that defensively extreme reactions to threats might be relieved. Implicitly priming threat-irrelevant goals completely eliminated defensive reactions to the threats. The goal prime in the irrelevant prime threat conditions shielded people from concern about the threat (Shah et al., 2002). It is interesting to speculate about whether similar shielding processes may explain why thinking about self-affirming personal values or strengths can eliminate defensive reactions to threats (McGregor, 2006; Schmeichel & Martens, 2005; Sherman & Cohen, 2006; Wichman, 2010), decrease ruminative thoughts about goal conflict (Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999), and forestall the hyperaccessibility of unwanted thoughts (Koole & van Knippenberg, 2007). From a goal regulation perspective, value affirmations could be considered abstract-goal primes (Carver & Scheier, 1998; Verplanken & Holland, 2002). If so, from a RAM perspective they would be expected to absorb attention and relieve concern about unrelated threats.

Toward an Integration of Experimental Threat and Defense Literature?

The current findings have speculative implications for resource-defense accounts of threat and defense in the experimental personality and social psychology literature. Dozens of theories posit that threats deplete a fundamental resource that people are motivated to restore. Defensive and ideologically extreme reactions are often seen as efforts to shore up the depleted resource. For example, cultural worldview extremes after mortality salience, attachment, and self-image threats have been viewed as efforts to bolster a sense of immortality (Greenberg et al., 1997), security (Hart et al., 2005), or self-worth (Schmeichel & Martens, 2005) undermined by the threats. The present results suggest the intriguing possibility that rather than being motivated by dips in immortality, security, or self-worth, defensively extreme reactions may essentially arise from anxiety caused by goal conflicts. Such an interpretation would not disprove resource-defense accounts; rather, with slight modification it would render them all compatible if the resources could be slightly recast as goals. It would also make it easy to understand why defensive reactions can sometimes be so far removed from the domain of the threat, a phenomenon referred to as fluid compensation (Allport, 1943; Steele, 1988). It may simply be the case that people heighten approach motivation for any salient goal or ideal to activate palliative RAM after goal conflicts.

Mortality salience research seems like a particularly good candidate for future research incorporating implicit goal primes. The clear conflict between death and all temporal goals may account for the reliable capacity of mortality salience to cause defensively extreme reactions in hundreds of studies over the past 25 years (Greenberg et al., 1997; Pyszczynski, Greenberg, Solomon, & Maxfield, 2006).

Research on meaning maintenance might similarly be interpreted from a goal regulation and RAM perspective. Like achievement, relationship, and mortality threats, meaning threats that arise from disrupted sense of coherence in one's environment have also been found to cause anxious arousal and defensively extreme

reactions (Heine, Proulx, & Vohs, 2006; Mendes, Blascovich, Hunter, Lickel, & Jost, 2007; Proulx & Heine, 2008; Proulx, Heine, & Vohs, 2010; see also Peterson, 1999). An incoherent environment that defies prediction should presumably activate BIS-mediated inhibition of any active goal and leave people feeling generally anxious and uncertain (Gray & McNaughton, 2000).

In support of this goal regulation interpretation of meaning threats, recent functional magnetic resonance imaging research shows that merely unpredictable (vs. predictable) auditory stimuli cause BIS-related brain activation (i.e., amygdala and hippocampal activation) and anxiety-related behavior (Herry et al., 2007). Defensiveness caused by subtle perceptual anomalies has been shown to be motivated by anxiety-related arousal with the same misattribution logic we used in Study 4 (Proulx & Heine, 2008). The goal regulation and RAM perspective could therefore also account for why seemingly innocuous threats like an out-of-context exclamation point, a cautionary yellow light, or an uncanny painting can cause the same defensively extreme ideological reactions as other threats (Proulx et al., 2010; van den Bos et al., 2008). Future research should test the goal regulation interpretation of defensive reactions to mortality salience and meaning threats using the goal-priming paradigm introduced in the present research. If goal primes prove to moderate defensively extreme reactions to other threats as well, then our suggested link between toddler tantrums and reactive ideological extremes would be supported. Goal conflicts make animals, toddlers, and adults eager to take up any action or mode of thinking that will activate the sanguine state of approach motivation. Lacking the capacity for abstract thought, animals and toddlers must resort to high-activity outbursts to activate RAM. It seems that adults, however, can activate RAM more efficiently, by stridently professing personal values (i.e., abstract goals).

For now, however, this interpretation must be considered preliminary, because the goal regulation account of threat, anxious uncertainty, RAM, and ideological extremes has been fully demonstrated only in the context of the specific achievement and relationship threats that have reliably caused defensively extreme ideological reactions in our research. Future research is needed to probe how well these same processes translate to other threat domains. The speculative theory we have outlined here has exciting generative potential for helping to integrate a large array of threat and defense findings in the experimental personality and social psychology literature. Further, the capacity of active goals to mute anxiety and defensiveness is consistent with the previous finding that threats caused reactive religious extremism only among participants with stalled goals in life (McGregor, Nash, & Prentice, 2010, Study 3). Future research could assess how goals might be managed for relief from anxiety and defensive extremes.

References

Aarts, H., Custers, R., & Holland, R. W. (2007). The nonconscious cessation of goal pursuit: When goals and negative affect are coactivated. *Journal of Personality and Social Psychology, 92,* 165–178. doi:10.1037/0022-3514.92.2.165

Allport, G. W. (1943). The ego in contemporary psychology. *Psychological Review, 50,* 451–478. doi:10.1037/h0055375

Amodio, D. M., Master, S. L., Yee, C. M., & Taylor, S. E. (2008). Neurocognitive components of the behavioral inhibition and activation systems: Implications for theories of self-regulation. *Psychophysiology, 45,* 11–19.

Amodio, D. M., Shah, J. Y., Sigelman, J., Brazy, P. C., & Harmon-Jones, E. (2004). Implicit regulatory focus associated with asymmetrical frontal cortical activity. *Journal of Experimental Social Psychology, 40,* 225–232. doi:10.1016/S0022-1031(03)00100-8

Arndt, J., & Goldenberg, J. L. (2002). From threat to sweat: The role of physiological arousal in the motivation to maintain self-esteem. In A. Tesser, D. A. Stapel, & J. V. Wood (Eds.), *Self and motivation: Emerging psychological perspectives* (pp. 43–69). Washington, DC: American Psychological Association. doi:10.1037/10448-002

Arndt, J., Greenberg, J., Solomon, S., Pyszczynski, T., & Simon, L. (1997). Suppression, accessibility of death-related thoughts, and cultural worldview defense: Exploring the psychodynamics of terror management. *Journal of Personality and Social Psychology, 73,* 5–18. doi:10.1037/0022-3514.73.1.5

Bargh, J. A., Gollwitzer, P. M., Lee-Chai, A., Barndollar, K., & Trötschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology, 81,* 1014–1027. doi:10.1037/0022-3514.81.6.1014

Bongers, K. C. A., Dijksterhuis, A., & Spears, R. (2009). Self-esteem regulation after success or failure to attain unconsciously activated goals. *Journal of Experimental Social Psychology, 45,* 468–477. doi:10.1016/j.jesp.2008.12.007

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior.* New York, NY: Cambridge University Press.

Chartrand, T. L., & Bargh, J. A. (2002). Nonconscious motivations: Their activation, operation, and consequences. In A. Tesser & D. A. Stapel (Eds.), *Self and motivation: Emerging psychological perspectives* (pp. 13–41). Washington, DC: American Psychological Association. doi:10.1037/10448-001

Coan, J. A., & Allen, J. J. B. (2003). The state and trait nature of frontal EEG asymmetry in emotion. In K. Hugdahl & R. J. Davidson (Eds.), *The asymmetrical brain* (pp. 565–616). Cambridge, MA: MIT Press.

Corr, P. J. (Ed.). (2008). *The reinforcement sensitivity theory of personality.* Cambridge, England: Cambridge University Press. doi:10.1017/CBO9780511819384

Davidson, R. J. (1998). Anterior electrophysiological asymmetries, emotion, and depression: Conceptual and methodological conundrums. *Psychophysiology, 35,* 607–614. doi:10.1017/S0048577298000134

Davidson, R. J., Pizzagalli, D., Nitschke, J. B., & Kalin, N. H. (2003). Parsing the subcomponents of emotion and disorders of emotion: Perspectives from affective neuroscience. In R. J. Davidson, K. R. Scherer, & H. H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 8–24). New York, NY: Oxford University Press.

Drake, R. A., & Myers, L. R. (2006). Visual attention, emotion, and action tendency: Feeling active or passive. *Cognition & Emotion, 20,* 608–622. doi:10.1080/02699930500368105

Eisenberger, N. I., Lieberman, M. D., & Williams, K. D. (2003). Does rejection hurt: An fMRI study of social exclusion. *Science, 302,* 290–292. doi:10.1126/science.1089134

Fitzsimons, G. M., & Shah, J. Y. (2008). How goal instrumentality shapes relationship evaluations. *Journal of Personality and Social Psychology, 95,* 319–337. doi:10.1037/0022-3514.95.2.319

Förster, J., Liberman, N., & Kuschel, S. (2008). The effect of global versus local processing styles on assimilation versus contrast in social judgment. *Journal of Personality and Social Psychology, 94,* 579–599. doi:10.1037/0022-3514.94.4.579

Friedman, R. S., & Förster, J. (2005). Effects of motivational cues on perceptual asymmetry: Implications for creativity and analytical problem solving. *Journal of Personality and Social Psychology, 88,* 263–275. doi:10.1037/0022-3514.88.2.263

Gable, P. A., & Harmon-Jones, E. (2008). Approach-motivated positive

affect reduces breadth of attention. *Psychological Science, 19,* 476–482. doi:10.1111/j.1467-9280.2008.02112.x

Gable, S. L. (2006). Approach and avoidance social motives and goals. *Journal of Personality, 74,* 175–222. doi:10.1111/j.1467-6494.2005.00373.x

Gay, P. (1989). *The Freud reader.* New York, NY: Norton.

Gray, J. A., & McNaughton, N. (2000). *The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system.* New York, NY: Oxford University Press.

Greenberg, J., Solomon, S., & Pyszczynski, T. (1997). Terror management theory of self-esteem and cultural worldviews: Empirical assessments and conceptual refinements. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 61–139). San Diego, CA: Academic Press.

Harmon-Jones, C., Schmeichel, B. J., Inzlicht, M., & Harmon-Jones, E. (2011). Trait approach motivation relates to dissonance reduction. *Social Psychological and Personality Science, 2,* 21–28. doi:10.1177/1948550610379425

Harmon-Jones, E., & Allen, J. J. B. (1998). Anger and frontal brain activity: EEG asymmetry consistent with approach motivation despite negative affective valence. *Journal of Personality and Social Psychology, 74,* 1310–1316. doi:10.1037/0022-3514.74.5.1310

Harmon-Jones, E., & Gable, P. A. (2009). Neural activity underlying the effect of approach-motivated positive affect on narrowed attention. *Psychological Science, 20,* 406–409. doi:10.1111/j.1467-9280.2009.02302.x

Hart, J., Shaver, P. R., & Goldenberg, J. L. (2005). Attachment, self-esteem, worldviews, and terror management: Evidence for a tripartite security system. *Journal of Personality and Social Psychology, 88,* 999–1013. doi:10.1037/0022-3514.88.6.999

Heine, S. J., Proulx, T., & Vohs, K. D. (2006). The meaning maintenance model: On the coherence of social motivations. *Personality and Social Psychology Review, 10,* 88–110. doi:10.1207/s15327957pspr1002_1

Herry, C., Bach, D. R., Esposito, F., Di Salle, F., Perrig, W. J., & Scheffler, K., . . . Seifritz, E. (2007). Processing of temporal unpredictability in human and animal amygdala. *Journal of Neuroscience, 27,* 5958–5966. doi:10.1523/JNEUROSCI.5218-06.2007

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52,* 1280–1300. doi:10.1037/0003-066X.52.12.1280

Jackson, D. C., Mueller, C. J., Dolski, I., Dalton, K. M., Nitschke, J. B., Urry, H. L., . . . Davidson, R. J. (2003). Now you feel it, now you don't: Frontal brain electrical asymmetry and individual differences in emotion regulation. *Psychological Science, 14,* 612–617. doi:10.1046/j.0956-7976.2003.psci_1473.x

Kay, A. C., Moscovitch, D. A., & Laurin, K. (2010). Randomness, attributions of arousal, and belief in God. *Psychological Science, 21,* 216–218. doi:10.1177/0956797609357750

Koole, S. L., Smeets, K., van Knippenberg, A., & Dijksterhuis, A. (1999). The cessation of rumination through self-affirmation. *Journal of Personality and Social Psychology, 77,* 111–125. doi:10.1037/0022-3514.77.1.111

Koole, S. L., & van Knippenberg, A. (2007). Controlling your mind without ironic consequences: Self-affirmation eliminates rebound effects after thought suppression. *Journal of Experimental Social Psychology, 43,* 671–677. doi:10.1016/j.jesp.2006.07.001

Kruglanski, A. W., Shah, J. Y., Fishbach, A., Friedman, R., Chun, W. Y., & Sleeth-Keppler, D. (2002). A theory of goal systems. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 34, pp. 331–378). San Diego, CA: Academic Press.

Lewin, K. (1935). *A dynamic theory of personality* (D. K. Adams & K. E. Zaner, Trans.). New York, NY: McGraw-Hill.

Marigold, D. C., McGregor, I., & Zanna, M. P. (2010). Defensive conviction as emotion regulation: Goal mechanisms and interpersonal implications. In R. M. Arkin, K. C. Oleson, & P. J. Carroll (Eds.), *The uncertain self: A handbook of perspectives from social and personality psychology* (pp. 232–248). Mahwah, NJ: Erlbaum.

McGregor, I. (2006). Offensive defensiveness: Toward an integrative neuroscience of compensatory zeal after mortality salience, personal uncertainty, and other poignant self-threats. *Psychological Inquiry, 17,* 299–308. doi:10.1080/10478400701366977

McGregor, I., Gailliot, M. T., Vasquez, N. A., & Nash, K. A. (2007). Ideological and personal zeal reactions to threat among people with high self-esteem: Motivated promotion focus. *Personality and Social Psychology Bulletin, 33,* 1587–1599. doi:10.1177/0146167207306280

McGregor, I., Haji, R., Nash, K. A., & Teper, R. (2008). Religious zeal and the uncertain self. *Basic and Applied Social Psychology, 30,* 183-188. doi:10.1080/01973530802209251

McGregor, I., & Jordan, C. H. (2007). The mask of zeal: Low implicit self-esteem, threat, and defensive extremism. *Self and Identity, 6,* 223–237. doi:10.1080/15298860601115351

McGregor, I., & Marigold, D. C. (2003). Defensive zeal and the uncertain self: What makes you so sure? *Journal of Personality and Social Psychology, 85,* 838–852. doi:10.1037/0022-3514.85.5.838

McGregor, I., Nail, P. R., Marigold, D. C., & Kang, S.-J. (2005). Defensive pride and consensus: Strength in imaginary numbers. *Journal of Personality and Social Psychology, 89,* 978–996. doi:10.1037/0022-3514.89.6.978

McGregor, I., Nash, K. A., & Inzlicht, M. (2009). Threat, high self-esteem, and reactive approach-motivation: Electroencephalographic evidence. *Journal of Experimental Social Psychology, 45,* 1003–1007. doi:10.1016/j.jesp.2009.04.011

McGregor, I., Nash, K., Mann, N., & Phills, C. E. (2010). Anxious uncertainty and reactive approach motivation (RAM). *Journal of Personality and Social Psychology, 99,* 133–147. doi:10.1037/a0019701

McGregor, I., Nash, K., & Prentice, M. (2010). Reactive approach motivation (RAM) for religion. *Journal of Personality and Social Psychology, 99,* 148–161. doi:10.1037/a0019702

McGregor, I., Zanna, M. P., Holmes, J. G., & Spencer, S. J. (2001). Compensatory conviction in the face of personal uncertainty: Going to extremes and being oneself. *Journal of Personality and Social Psychology, 80,* 472–488. doi:10.1037/0022-3514.80.3.472

Mendes, W. B., Blascovich, J., Hunter, S. B., Lickel, B., & Jost, J. T. (2007). Threatened by the unexpected: Physiological responses during social interactions with expectancy-violating partners. *Journal of Personality and Social Psychology, 92,* 698–716. doi:10.1037/0022-3514.92.4.698

Mikulincer, M., Florian, V., & Hirschberger, G. (2003). The existential function of close relationships: Introducing death into the science of love. *Personality and Social Psychology Review, 7,* 20–40. doi:10.1207/S15327957PSPR0701_2

Nash, K., Inzlicht, M., & McGregor, I. (2011). *Prefrontal EEG asymmetry characteristic of approach motivation predicts muted error-related negativity.* Unpublished manuscript, Department of Psychology, York University, Toronto, Canada.

Nash, K., McGregor, I., & Inzlicht, M. (2010). Line bisection as a neural marker of approach motivation. *Psychophysiology, 47,* 979–983.

Pavlov, I. P. (1927). *Conditioned reflexes: An investigation of the physiological activity of the cerebral cortex* (G. V. Anrep, Trans. & Ed.). London, England: Oxford University Press.

Peterson, J. B. (1999). *Maps of meaning: The architecture of belief.* New York, NY: Routledge.

Proulx, T., & Heine, S. J. (2008). The case of the transmogrifying experimenter: Affirmation of a moral schema following implicit change detection. *Psychological Science, 19,* 1294–1300. doi:10.1111/j.1467-9280.2008.02238.x

Proulx, T., & Heine, S. J. (2010). The frog in Kierkegaard's beer: Finding meaning in the threat-compensation literature. *Social and Personality*

Psychology Compass, 4, 889–905. doi:10.1111/j.1751-9004 .2010.00304.x

Proulx, T., Heine, S. J., & Vohs, K. D. (2010). When is the unfamiliar the uncanny? Meaning affirmation after exposure to absurdist literature, humor, and art. *Personality and Social Psychology Bulletin, 36,* 817– 829. doi:10.1177/0146167210369896

Pyszczynski, T., Greenberg, J., Solomon, S., & Maxfield, M. (2006). On the unique psychological import of the human awareness of mortality: Theme and variations. *Psychological Inquiry, 17,* 328–356. doi: 10.1080/10478400701369542

Quirin, M., Loktyushin, A., Arndt, J., Küstermann, E., Lo, Y.-Y., Kuhl, J., & Eggert, L. (2011). Existential neuroscience: A functional magnetic resonance imaging investigation of neural responses to reminders of one's mortality. *Social Cognitive and Affective Neuroscience.* Advance online publication. doi:10.1093/scan/nsq106

Schmeichel, B. J., & Martens, A. (2005). Self-affirmation and mortality salience: Affirming values reduces worldview defense and death-thought accessibility. *Personality and Social Psychology Bulletin, 31,* 658–667. doi:10.1177/0146167204271567

Shah, J. Y., Friedman, R., & Kruglanski, A. W. (2002). Forgetting all else: On the antecedents and consequences of goal shielding. *Journal of Personality and Social Psychology, 83,* 1261–1280. doi:10.1037/0022-3514.83.6.1261

Sherman, D. K., & Cohen, G. L. (2006). The psychology of self-defense: Self-affirmation theory. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 38, pp. 183–242). San Diego, CA: Academic Press.

Shrira, I., & Martin, L. L. (2005). Stereotyping, self-affirmation, and the cerebral hemispheres. *Personality and Social Psychology Bulletin, 31,* 846–856. doi:10.1177/0146167204272232

Spencer, S. J., Zanna, M. P., & Fong, G. T. (2005). Establishing a causal chain: Why experiments are often more effective than mediational analyses in examining psychological processes. *Journal of Personality and Social Psychology, 89,* 845–851. doi:10.1037/0022-3514.89.6.845

Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 21, pp. 261–302). San Diego, CA: Academic Press.

Taylor, S. E., & Gollwitzer, P. M. (1995). Effects of mindset on positive illusions. *Journal of Personality and Social Psychology, 69,* 213–226. doi:10.1037/0022-3514.69.2.213

Tesser, A., Pilkington, C. J., & McIntosh, W. D. (1989). Self-evaluation maintenance and the mediational role of emotion: The perception of friends and strangers. *Journal of Personality and Social Psychology, 57,* 442–456. doi:10.1037/0022-3514.57.3.442

Vaillant, G. E. (1992). *Ego mechanisms of defense: A guide for clinicians and researchers.* Washington, DC: American Psychiatric Association.

Vallacher, R. R., & Wegner, D. M. (1987). What do people think they're doing? Action identification and human behavior. *Psychological Review, 94,* 3–15. doi:10.1037/0033-295X.94.1.3

van den Bos, K., Ham, J., Lind, E. A., Simonis, M., van Essen, W. J., & Rijpkema, M. (2008). Justice and the human alarm system: The impact of exclamation points and flashing lights on the justice judgment process. *Journal of Experimental Social Psychology, 44,* 201–219. doi: 10.1016/j.jesp.2007.03.001

van Veen, V., Krug, M. K., Schooler, J. W., & Carter, C. S. (2009). Neural activity predicts attitude change in cognitive dissonance. *Nature Neuroscience, 12,* 1469–1474. doi:10.1038/nn.2413

Verplanken, B., & Holland, R. W. (2002). Motivated decision making: Effects of activation and self-centrality of values on choices and behavior. *Journal of Personality and Social Psychology, 82,* 434–447. doi: 10.1037/0022-3514.82.3.434

Wenzlaff, R. M., & Wegner, D. M. (2000). Thought suppression. *Annual Review of Psychology, 51,* 59–91. doi:10.1146/annurev.psych.51.1.59

Wichman, A. L. (2010). Uncertainty and religious reactivity: Uncertainty compensation, repair, and inoculation. *European Journal of Social Psychology, 40,* 35–42. doi:10.1002/ejsp.712

Wichman, A. L., Brunner, R. P., & Weary, G. (2008). Immediate and delayed effects of causal uncertainty inductions on uncertainty accessibility. *Journal of Experimental Social Psychology, 44,* 1106–1113. doi:10.1016/j.jesp.2007.12.002

Zanna, M. P., & Cooper, J. (1974). Dissonance and the pill: An attribution approach to studying the arousal properties of dissonance. *Journal of Personality and Social Psychology, 29,* 703–709. doi:10.1037/h0036651