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The uncertainty management model (UMM) addresses a basic predicament of the human condition. Personal Uncertainty (PU) has long been identified by classic philosophical, sociological, and psychological theories as a cause of rigid and aggressive phenomena from repression and suicide to prejudice and hate. In this commentary, we review a Reactive Approach Motivation (RAM) view of compensatory conviction and worldview defense that is consistent with the UMM and grounded in the neuropsychology of anxiety. We also report new findings from our lab, cited in the target article, which further illuminate precise triggers of UMM and RAM outcomes. A complementarity of the UMM and our research is that the UMM tends to focus on affective reactions to PU, and our research tends to focus on compensatory worldview reactions to PU. Together, UMM and RAM research support the classic, multidisciplinary observation that PU is aversive and causes consequential outcomes.

## Compensatory Conviction in the Face of PU

In the UMM work described in the target article, distress and anger are caused by PU and violations to worldview norms (e.g., unfairness). This work indirectly supports the claim that the worldview norms are motivated by a need to cope with uncertainty. In our complementary work, various PU threats have directly heightened worldview and personal convictions. We have shown that PU causes people to not only cling more rigidly to meaningful worldviews but also exaggerate the objectivity of their idiosyncratic opinions about contentious social issues—as if trying to turn their subjective opinions into objective worldviews.

In the first of this compensatory conviction work, we induced PU by requiring participants to write about difficult personal dilemmas they were currently facing in their own lives (McGregor, Zanna, Holmes, & Spencer, 2001). The manipulation required participants to write about the uncertain pros and cons of the incompatible possibilities represented by the dilemma (e.g., marry my boyfriend or dump him; stay in Engineering or switch to Arts). For the control condition, participants wrote about a dilemma of a friend, instead. This PU threat caused participants to exaggerate conviction and assume greater social consensus for personal opin-

ions about capital punishment and abortion (Study 1). It also caused them to exaggerate their dominant personal values and the extent to which their personal projects in life served those values (Study 2). Studies 3 and 4 further found that other PU manipulations caused intergroup biases and the quest for meaning in goals and life. We have conceptually replicated these findings with several manipulations of PU, such as, highlighting the uncertain future of a floundering relationship (McGregor & Marigold, 2003, Study 3) or confronting participants with bewildering academic uncertainties and insecurities (McGregor, Nail, Marigold, & Kang, 2005, Study 2). These compensatory conviction effects have also been conceptually replicated with dependent measures closely aligned with world affairs and worldviews. For example, several of our PU threats have caused more zealous religious conviction. In the face of uncertainty participants tend to claim that their own religious beliefs are more objectively correct than others' and increase their willingness to die and support a war to defend their religious views if necessary (McGregor, Haji, Nash, & Teper, 2008; McGregor, Nash, & Prentice, 2009). The academic PU manipulation also caused participants to exaggerate extremity and confidence in convictions for or against the legitimacy of suicide bombing as a method of warfare and the U.S. invasion of Iraq (McGregor & Jordan, 2007).

## Convictions Are Palliative

All of the aforementioned compensatory conviction reactions have also been associated with effective relief from PU. Writing about how personal goals promote core values and identifications relieves anxious uncertainty and prevents compensatory conviction reactions to PU (McGregor et al., 2001, Study 4). Writing about opinion and value convictions similarly makes participants' personal dilemmas feel less important and easier to forget about (McGregor, 2006; McGregor & Marigold, 2003, Study 4). Describing important identifications with meaningful in-groups relieves distress and worldview defense reactions to uncertain personal dilemmas (McGregor et al., 2005, Study 4; McGregor, Haji, & Kang, 2008). Moreover, religious and political convictions are associated with decreased reactivity in

the brain region that responds to conflict and uncertainty, the Anterior Cingulate Cortex (ACC; Amodio, Jost, Master, & Yee, 2007; Inzlicht, McGregor, Hirsh, & Nash, 2009). Of importance, the ACC is the cortical alarm bell that van den Bos and colleagues have linked to various PU manipulations (see the target article). Thus, there is experimental and neural support for the conclusion that people spontaneously turn to compensatory convictions and worldview defenses for PU relief.

### **Motivational Mechanics: Worldview Defense as RAM**

Why should extreme ideological convictions insulate people from distress about unrelated PU? Our RAM hypothesis is grounded in basic research on the neuropsychology of anxiety and is supported by converging neural, implicit, dispositional, and goal regulation evidence. In all vertebrates anxious arousal arises from motivationally conflicted states (Gray & McNaughton, 2000). It is relieved when the animal restores unequivocal approach of a clear goal. Active approach can confer a (typically) adaptive tunnel vision that constrains attention to incentives relevant to a focal goal (McGregor, Nash, Mann, & Phillips, 2009). Indeed, approach-related brain activity (left frontal) is correlated with both incentive-constrained attention (Harmon-Jones & Gable, 2009) and muted activity in the ACC (Nash, McGregor, & Inzlicht, 2009).

The key to understanding worldview defense as reactive approach motivation is that meanings and worldview ideals are closely linked to approach-motivation processes. According to theories of goal regulation, ideals essentially function as abstract goals that guide more concrete subordinate goals (reviewed in McGregor, Nash, Mann, & Phillips, 2009). Accordingly, focusing on worldview ideals can provide a clear, transcendent “goal” to eagerly approach when temporal goals are conflicted or uncertain. Ideological conviction can thereby activate an eager, approach-motivated state and insulate people from anxiety. Indeed, meaning in life, ideals, and value salience are correlated with left frontal neural activity characteristic of approach motivation (reviewed in McGregor, Nash, Mann, et al., 2009).

Ideals and ideologies are economically suited for RAM in humans. They can be efficiently and reliably promoted in the privacy of one’s own imagination, free from conflict and impedance in the temporal realm. No physical resources need be committed to derive the palliative benefits of ideological conviction. The elusiveness of transcendent ideals may also preserve their motivational value from habituation and disillusionment.

Past research has indeed found that when people are faced with anxiety-inducing threats to important goals (which we see as the essential cause of PU), idealism mediates and moderates the tendency toward RAM (McGregor, Nash, Mann, et al., 2009). Specifically, such threats to important goals caused implicit (elevated self-approach Implicit Association Test scores) and behavioral neuroscience (left hemispheric dominance indicated by the line bisection task) evidence of RAM, especially if ideals were primed (Study 4) and to the extent that idealistic goals were salient (Study 3). Furthermore, in that research the domain of the RAM was unrelated to the domain of the threat. Thus, the function of the idealism may be merely to activate unequivocal approach-motivation processes to relieve vigilant preoccupation with threats, in general, as proposed by the RAM view of worldview defense.

Dispositional evidence is also consistent with the RAM view of compensatory conviction and worldview defense. High self-esteem and other dispositions related to approach motivation, including Behavioral Activation System and Regulatory Promotion-Focus have consistently been associated with the most extreme worldview defense reactions to threats related to PU (McGregor, Gailliot, Vasquez, & Nash, 2007, Studies 1–3; McGregor & Marigold, 2003, Studies 1–3; McGregor et al., 2005, Studies 1–3; McGregor, Nash, & Prentice, 2009, Study 3). High self-esteem also predicts elevations in left frontal neural activity characteristic of approach motivation after an academic uncertainty threat (McGregor, Nash, & Inzlicht, 2009).

The goal regulation assumptions guiding the RAM hypothesis are also supported by evidence indicating that the same uncertainty threats that cause worldview defense also cause participants to eagerly engage in more idealistic and approach-motivated personal projects in their everyday lives (McGregor et al., 2007; McGregor, Nash, Mann, et al., 2009; McGregor et al., 2001; Nash, McGregor, & Prentice, 2009). Moreover, reactive approach motivation for personal projects is heightened only when PU threats are preceded by implicitly primed personal goals in the same domain as the threats (Nash et al., 2009). Intriguingly, this research also found that mortality salience similarly caused reactive approach motivation only if it was preceded by implicit goal primes. These goal priming findings suggests that PU and mortality salience threats are threatening and cause defensive reactions to the extent that they introduce avoidance cues in the course of actively approaching goals. It is precisely this kind of simultaneous activation of approach and avoidance motives that gives rise to anxious arousal (cf. Gray & McNaughton, 2000). Thus, there is considerable evidence for a goal regulation view of RAM in the face of PU.

### PU and Worldview Defense: New Empirical Support for the UMM and RAM

In our laboratory we use threats that require people to confront conflicts or uncertainties relevant to the things they care deeply about in their own lives. Our assumption has always been that in order to be threatening enough to cause defensive reactions, PU manipulations must involve conflict or uncertainty about deeply important personal goals. Otherwise, participants could simply disengage from the trivial task, rendering defensive behavior unnecessary. Most undergraduates are too invested in them. Experimentally induced conflicts to such important goals, then, should be expected to induce the simultaneous approach and avoidance motivation conditions necessary for anxious arousal, as the participants continue to orient toward the goal but away from the frustration or conflict. We think this is why the PU manipulations in our laboratory have so reliably caused anxious distress and compensatory conviction reactions.

At first, the PU manipulation most commonly used in the van den Bos lab seems more trivial than the PU manipulations used in our lab. Their most common PU manipulation simply asks participants to describe their thoughts and feelings about being uncertain. The English translation of their experimental materials may be misleading, however. As alluded to in the target article, the English word *uncertainty* can be interpreted as PU but can also be interpreted more trivially as informational uncertainty. Dutch and German translations come closer to the English word for “insecurity,” however. In English, the word *insecurity* less ambiguously implies PU about important goals (e.g., about love or success). To empirically assess this translational issue, we conducted a simple study.

#### Study 1: Effects of Uncertainty, Insecurity, and Uncertainty about School on Worldview Defense

In an Internet study we randomly assigned undergraduate participants to one of three experimental conditions. In the uncertainty salience condition participants received the following two prompts as in the typical English translation of the van den Bos manipulation: “Please describe the emotions that the thought of feeling uncertain arouses in you” and “Please jot down, as specifically as you can, what you think will happen to you physically as you feel uncertain.” In an insecurity salience condition the prompts were the same, except that the word “insecurity” replaced the word “uncertainty.” In the uncertainty about school condition, the phrase “uncertainty about school” replaced the words “uncertainty” or “insecurity.” We expected participants to react with most worldview defense in the insecurity and uncertainty about school conditions

because “insecurity” and “uncertainty about school” invoke important personal goals to a greater extent than merely the English word “uncertainty.”

To ensure quality of data and to remove participants who completed the Internet materials too quickly to become experientially involved or so slowly they may have been distracted by other activities, we analyzed data only from participants who took between 20 and 45 min. A 3-min, free-thought delay period long enough to allow for worldview defense reactions to emerge followed each set of prompts. For the main dependent variable, we assessed Religious Zeal (expanded from McGregor et al., 2008) as a marker of worldview defense. Participants used a 1-to-5 scale to rate their agreement with 20 statements reflecting conviction; devotion; loyalty; belief in objectivity; and willingness to argue, fight, and die if necessary for their religious convictions.

Results of an analysis of variance (ANOVA) were statistically significant,  $F(2, 48) = 3.89, p < .05$ , with simple effects revealing more religious zeal ( $p < .05$ ) in both the insecurity salience condition ( $M = 3.01$ ) and the uncertainty about school condition ( $M = 3.01$ ) than in the uncertainty salience condition ( $M = 2.47$ ). These results help illuminate the discrepancy between results of the van den Bos uncertainty manipulation in the Netherlands versus the United States where its effects have typically failed to replicate, and the importance of differentiating PU from other kinds of more trivial uncertainty less likely to cause distress and defensive reactions, as emphasized in the target article.

Finally, as an aside in this study, we also included a randomly assigned mortality salience condition, to further probe possible integrative links between UMM and mortality salience research as discussed in the target article. Results revealed marginally more religious zeal in the mortality salience ( $M = 2.86$ ) than the uncertainty salience condition ( $M = 2.47, p = .10$ ). This finding resolves the controversy that apparently resulted from differential Dutch and English meanings of the word *uncertainty*. When PU manipulations are translated so as to reflect experiential PU, they cause at least as much worldview defense as mortality salience.

#### Study 2: Goal Conflicts and Frustrations vs. Big Problems as a Trigger for UM by RAM

The previous study implicates experiential uncertainty as a cause of worldview defense but does not fully address the goal regulation assumptions of our RAM view. According to Gray and McNaughton’s (2000) theory of anxiety, the basis for anxious uncertainty is goal conflict or frustration that simultaneously activates approach and avoidance motives. Serious problems not in the context of active goal pursuit may cause panic or depression but should not cause anxious arousal or worldview defense. Anxious uncertainty and

RAM should only occur as a result of motivational ambiguity. We conducted another simple experiment to test this hypothesis.

We randomly assigned undergraduate participants to one of three experimental conditions. In the goal frustration condition participants responded to the following two prompts: "Take a few minutes to describe an important goal you are pursuing that is not going very well and is impeded by a frustrating obstacle or obstacles" and "Please describe how you feel when you think about this difficulty." In the goal conflict condition, participants responded to the following two prompts: "Take a few minutes to describe a current situation in which you feel torn in deciding between similarly promising goals, but really you can only afford to pursue one" and "Please describe how you feel when you think about this difficulty." In the serious problem condition, participants responded to the following two prompts: "Take a few minutes to describe a big problem that is currently making you seriously reassess who you are as a person, your values, and/or how the world works around you" and "Please describe how you feel when you think about this difficulty." We expected participants to react with most worldview defense in the goal frustration and goal conflict conditions, which reflect motivational ambiguity.

Again, to ensure quality we analyzed data only from participants who took a reasonable amount of time to complete the online study (i.e., between 15 and 40 min). After each set of prompts, we included a 3-min, free-thought delay period and approximately 5 min worth of materials relevant to other hypotheses. For the main dependent variable, we then included the five-item Search for Meaning subscale of the Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006, p. 93) that assesses the extent to which participants are "looking," "searching," and "seeking" "meaning," "purpose," and "mission" in life. We also included the five-item Presence of Meaning subscale for comparison. Participants responded to both on a 1-to-7 scale. Given our goal regulation view of RAM and worldview defense, we expected that participants in the goal frustration and goal conflict conditions would be particularly motivated to approach or pursue meaning and mission in life, as reflected on the Search for Meaning subscale of the MLQ. Other PU threats have increased meaning seeking but not presence of meaning in past research (McGregor et al., 2001, Study 4).

Results of an ANOVA with search for meaning as the dependent variable were statistically significant,  $F(2, 96) = 5.32, p < .01$ , with simple effects revealing significantly more search for meaning in both the goal frustration condition ( $M = 4.97$ ) and the goal conflict condition ( $M = 5.38$ ) than in the serious problem condition ( $M = 4.36, ps < .05$  and  $.005$ , respectively). In contrast, there was a null ANOVA effect with presence of meaning as the dependent variable ( $F < 1$ ). These

results indicate that even serious difficulties are not enough to cause worldview defense unless they invoke motivational conflict in the context of active goal pursuit (as proposed by Gray & McNaughton, 2000, and our RAM view). These results also provide additional support for our goal regulation interpretation of uncertainty management by worldview defense. Conflict and frustration in the context of goal pursuit specifically caused pursuit, but not exaggerated presence, of meaning (as in McGregor et al., 2001, Study 4).

## Discussion

UMM and RAM perspectives suggests an integrative view of various theories related to worldview defense. Both perspectives begin with the important distinction between experiential PU versus merely informational forms of uncertainty, and demonstrate that worldview and RAM responses to mortality salience and PU are driven by similar processes. Further, both perspectives implicate basic goal regulation processes including neural involvement of the Anterior Cingulate Cortex and approach motivation insofar as anger is an approach-motivated emotion (Carver & Harmon-Jones, 2009). Conceptually, both perspectives also support meso-level explanations compatible with both reductionistic neural analyses and abstract concepts of meaning maintenance and worldview defense. Finally, UMM and RAM approaches to understanding worldview defense are consistent not only with classic theories in the humanities and social sciences that highlight the human predicament of existential uncertainty but also with classic psychoanalytic and neoanalytic theories that emphasize intrapsychic conflict as the core challenge for human character. Indeed, the UMM and RAM perspectives could be seen as building on early efforts by Kurt Lewin to understand consequential social phenomena in terms of conflict and goal regulation. Existential uncertainty ultimately boils down to multiple approach-avoidance conflict, as one contemplates various mutually exclusive alternatives for action. We hope that the complementary body of theoretically grounded empirical work from UMM and RAM perspectives will help integrate theories of threat and worldview defense.

## Note

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