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Curiosity enhances the role of mindfulness in reducing defensive responses to existential threat

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ABSTRACT

Using a terror management theory paradigm, the present research assessed whether people characterized by both an attitude of curiosity, as well as mindful attention, would exhibit non-defensive reactions to targets that threaten their worldview. Participants ($N = 118$) were randomly assigned to an existential threat (mortality salience) condition or a control condition then asked to read an essay describing humans as just another animal or an essay describing the uniqueness of humans. Participants higher in both curiosity and mindful attention responded non-defensively, rating the humans as animals essay writer as likeable and intelligent, with a valid opinion. Participants who were high in mindfulness but low in curiosity responded defensively, with negative judgments of the essay writer. Mindlessness (endorsing low curiosity and mindful attention) also mitigated defensive responding. Although mindful and mindless people both showed non-defensive reactions, we theorize about distinct causal paths. Results suggest that curiosity plays an important, understudied role in the benefits linked to mindfulness.

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1. Introduction

Broadly conceptualized, mindfulness is defined as a receptive attention to what is happening in the present moment that, in practice, can be facilitated by an attitude of interest or curiosity (Bishop et al., 2004; Williams, 2008). Phenomenologically, a person practicing mindfulness observes events and experience with an orientation of curiosity, regardless of the valence of the stimuli observed. This quality of attention is non-evaluative; even when experiences are painful or difficult, a person is receptive and curious instead of seeking to avoid or alter thoughts or feelings (Hayes, Luoma, Bond, Masuda, & Lillis, 2006).

Curiosity may be particularly important to the exercise of mindfulness in challenging or threatening experiential contexts, as this attitude can make experiences more openly accessible to mindful attention (Bishop et al., 2004). Because curiosity concerns an embrace of novelty and openness to new experiences (Kashdan et al., 2009), it may operate to counter attempts to avoid or alter difficult thoughts, feelings, or situations. Curiosity focuses a person's attention and motivates them to explore their environment with an appreciation of novelty, challenge, and uncertainty (Harmon-Jones & Gable, 2009; Silvia & Kashdan, 2009).

People who are predisposed to mindful attention, or trained to be mindful, show greater openness to information that challenges their personal beliefs (Niemic et al., 2010). In an attempt to extend this work, we sought evidence that curiosity can leverage the value of mindful presence in responding non-defensively to threatening events. The existential threat that occurs when considering one's own death is a central threat to the self and provided the test case for the hypothesis that curiosity and mindful attention can operate together to foster adaptive responses to this threat.

1.1. Terror management theory

Terror management theory (TMT) proposes that as intelligent creatures, humans are aware that their own death is unavoidable. This recognition creates the potential for omnipresent existential anxiety. When a person's mortality is made apparent by instructing people to consider their own death, unconscious existential anxiety is generated that is then managed through two key defensive reactions (Pyszczynski, Greenberg, & Solomon, 1999). In the short-term, proximal defenses such as the suppression of death-related thoughts operate at the conscious level. Proximal defenses only push a threat of existential anxiety away temporarily without actually resolving it. Scientists have discovered that this suppression attempts merely to push death-related thoughts beyond conscious awareness, leading to the threat manifesting at the unconscious level. When unsuccessful, the use of proximal

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defenses results in the use of distal defenses to ward off death anxiety (Burke, Martens, & Faucher, 2010).

Distal defenses, such as affirmation of one's cultural worldview, serve as protection from highly accessible death-related thoughts that are outside of conscious awareness. A cultural worldview provides an explanation for existence and a set of values that prescribe good and bad behavior. By acting in accordance with the values of their cultural worldview, humans are able to believe that their lives have lasting meaning and they will achieve immortality after their body perishes.

Much of the TMT literature has focused on the social consequences that can follow defense of worldviews to ward off existential anxiety. When reminded of the inevitability of death, in-group favoritism and out-group hostility is enhanced. This defensive position reaffirms a person's security in their own cultural worldview, which in turn alleviates anxiety. However, evidence has emerged for basic existential threats that affect nearly all human beings, regardless of their cultural worldviews. When primed to consider their own death, Goldenberg et al. (2001) found that it is threatening to be reminded that humans, in the end, are simply animals that crave food, water, sex, and sleep (i.e., our "creatureliness"). According to TMT, one strategy for managing existential anxiety is to focus on the higher meaning of human life. Being reminded that humans are no different from other animals directly undermines this strategy. After mortality salience, people who read an essay describing humans as similar to animals resulted in denigration of the essay writer, thereby alleviating the threat generated by their commentary (Goldenberg et al., 2001).

1.2. Terror management theory and mindfulness

Evidence has emerged that mindful attention reduces both proximal and distal defensive responses to existential threat. In a series of studies, Niemiec et al. (2010) found that those with a disposition toward mindful attention engaged in less thought suppression following a mortality salience induction, and were less likely to respond to existential threat with a variety of distal worldview defenses or with distal defense of self-esteem.

Mindfulness is theorized to be distinct from other buffers against existential anxiety in that it does not manage existential threat through reaffirming the values of a specific cultural worldview but rather through the way in which mindful people process threatening information. Thus, mindfulness does not appear to require the bolstering of one worldview at the expense of another.

1.3. The present study

Evidence indicates that mindful attention can buffer defensive responses to existential threat (Niemiec et al., 2010), and researchers have theorized that curiosity might enhance the value of this dimension in openly (non-defensively) responding to personal threats. Our central hypothesis was that people with dispositionally higher levels of both mindful attention and curiosity would exhibit less defensive reactions to an existential threat than those with higher levels of either one alone, or those lower in both traits. To examine this, we believed it was appropriate to examine a form of defense that affects a wide array of people, regardless of their particular cultural worldview. Thus, we used a paradigm in which mortality salience was induced, after which individuals were shown an essay emphasizing either the similarities between people and other animals (i.e., "creatureliness") or the uniqueness of human beings (Goldenberg et al., 2001). People who were both mindfully attentive and curious were expected to show a benign response to information suggesting that humans are simply one of many creatures in the animal kingdom. That is, curiosity was expected to enhance the value of mindfulness as a buffer against an

existential threat to the self. Finally, to address construct specificity, we controlled for trait self-esteem and the Big Five personality traits to insure curiosity and mindful attention effects were not accounted for by other positive attributes or neuroticism, and controlled for political attitudes because liberals tend to be morally focused on equality and might be more prone to accept views that animals and humans are more similar than different.

2. Method

2.1. Participants

Participants consisted of 118 undergraduate students at a large, Mid-Atlantic university. Of the participants, 95 (80%) were women and 23 (20%) were men. All were 18 or older with a mean age of 19.81 ($SD = 3.25$). Participants identified themselves as Caucasian ($n = 72$; 60%), as Asian-American ($n = 21$; 18%), African-American ($n = 13$; 11%), Hispanic ($n = 5$; 4%), Native-American ($n = 1$; 1%), or another race or ethnicity ($n = 6$; 5%). Students received research credit for their participation after being recruited from online advertisements in the psychology department. All students provided informed consent and this study met The Code of Ethics of the World Medical Association.

2.2. Procedure

There were two parts to the experiment. In the first part, participants completed a series of demographic and personality trait questionnaires, including measures of mindful attention and curiosity (see Section 2.3). Then participants were randomly assigned to one of two experimental inductions (identical to prior designs; e.g., Greenberg, Solomon, & Pyszczynski, 1997). In Version A, participants received a mortality salience induction where they were asked to describe what they thought would happen to them as they died and after they were dead in explicit detail, including any emotions aroused by the thought of their own death. In Version B, the control condition, participants were asked to imagine the experience of dental pain including what they thought would happen to them as they experienced dental pain and after they had experienced it, including thoughts and emotions aroused by the dental pain. In sum, participants were randomized into each cell of our 2 (mortality salience, $n = 54$ versus control, $n = 64$) \times 2 (self-threat, $n = 62$ versus control, $n = 56$) design.

The first part was followed by an assessment of mood, which served as a delay between the induction and the second part wherein participants read an essay that they were told was written by a senior honors student at a local university (identical to study 2 of Goldenberg et al., 2001). In Version A, the self threat condition, participants read an essay that described humans as slightly more intelligent than other animals but otherwise no different from animals in any meaningful way (humans as just another animal). In Version B, the control condition, participants read an essay that described humans as having characteristics such as the capacity for language and morality that made them highly unique from other animals (humans as unique). In both conditions, after reading the essay participants were asked to rate the essay writer on intelligence, how much they agreed with them, and how much they liked them.

2.3. Measures

2.3.1. Curiosity

The 10-item Trait Curiosity and Exploration Inventory-II (CEI-II; Kashdan et al., 2009) assesses the degree to which people tend to seek out new knowledge and experiences and be willing to

embrace the novelty and uncertainty of everyday life. Items are rated on a 5-point Likert scale, from 1 (slightly or not at all) to 5 (extremely). Sample items include 'I actively seek as much information as I can in new situations.' The CEI-II has been shown to exhibit good reliability, temporal stability, and construct specificity (Kashdan et al., 2009).

2.3.2. Mindfulness

The 15-item Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) assesses trait levels of mindfulness. Responses were made on a 6-point Likert-type scale, ranging from 1 (*almost always*) to 6 (*almost never*). Sample items (reverse-scored) include 'I rush through activities without being really attentive to them.' Higher scores reflected greater mindfulness. The MAAS has been shown to have good psychometric properties (Brown & Ryan, 2003).

2.3.3. Assessment of essay writer

How much participants liked the essay writer was based on responses to five items reflecting how much they liked them, viewed them as intelligent, believed they were intelligent, agreed with their opinion of human nature, and think their opinions were true. Responses were made on a 9-point Likert-type scale, ranging from 1 (*not at all*) to 9 (*very much*), and aggregated. This scale has been shown to have good psychometric properties (e.g., Goldenberg et al., 2001).

2.3.4. Self-esteem

The Rosenberg Self-esteem Scale (Rosenberg, 1965) assessed positive attitude toward one's self (10 items; e.g., 'I feel that I have a number of good qualities'). Responses were made on a 4-point scale, ranging from 1 (strongly disagree) to 4 (strongly agree).

2.3.5. Big Five personality traits

With 12 items for each subscale, the NEO-FFI (Costa & McCrae, 1992) assessed openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Responses were made on a 5-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

2.3.6. Political orientation

To assess political attitudes, three items asked about participant views on foreign policy, economic, and social issues (Pratto, Sidanius, Stallworth, & Malle, 1994). The fourth item asked, 'When it comes to politics, where would you place yourself on the following continuum?' Responses were made on a 7-point scale, ranging from 1 (very liberal) to 7 (very conservative). Items were aggregated into a single score.

3. Results

3.1. Preliminary analyses

Curiosity had moderate positive associations with both openness to experience and extraversion and moderate sized negative associations with neuroticism and conservative political views. Mindful attention had moderate positive associations with both conscientiousness and agreeableness and negative associations with neuroticism and self-esteem. A statistically significant relationship was not found between curiosity and mindful attention. See Table 1 for descriptive data and a correlation matrix.

There was a trend such that people who received the mortality salience induction had a less positive assessment of essay writers ($M = 25.22$, $SD = 8.66$), regardless of what they wrote about, compared with those receiving the dental pain induction ($M = 27.89$, $SD = 8.50$), $t(116) = 1.69$, $p < .10$. People who read the essay describing humans as unique gave a more positive assessment of the essay writer ($M = 28.32$, $SD = 8.25$) than people who read the essay describing humans as just another animal ($M = 25.18$, $SD = 8.78$), $t(116) = 2.00$, $p < .05$. There was no significant interaction between induction and essay writer conditions ($p = .64$). These results marginally support the main effect of the mortality salience procedure to induce defense and defensive responding to the 'human as animals' condition across conditions.

In the absence of synergy between a mortality salience effect and worldview defense, we focused on how individual differences in mindful attention and curiosity alter worldview defense. To justify collapsing across the sample, regardless of experimental conditions received, we tested for the presence of interactions between either mindful attention or curiosity and the conditions. Mindful attention failed to show significant interactions with experimental induction received ($p = .12$) or essay ($p = .47$). Similarly, curiosity did not interact with the type of threat induction received—mortality salience or dental pain ($p = .71$), or essay ($p = .56$).

3.2. Influence of mindfulness on assessing writers

We constructed a hierarchical regression model to determine whether the interaction between curiosity and mindful attention predicted how participants assessed essay writers. Both predictors were centered to minimize multicollinearity. An initial model examined the viability of a four-way Curiosity \times Mindful Attention \times Essay \times Induction interaction. We failed to find support for the four-way interaction ($p = .65$) and of the three-way interactions, only Curiosity \times Mindful Attention \times Essay was meaningful, $t(102) = 3.30$, $p < .001$ (ps ranged from .49 to .85 for the other

Table 1
Descriptive data and correlation matrix.

	α	1	2	3	4	5	6	7	8	9	10
1. Curiosity	.85	–									
2. Mindful attention	.87	–.14	–								
3. Self-esteem	.92	–.17	–.33*	–							
4. Conservative views	.86	–.26*	–.15	.12	–						
5. Essay writer	.88	.16	–.02	.02	.08	–					
6. Openness	.66	.51*	–.03	.04	–.35*	–.07	–				
7. Conscientiousness	.85	.20*	.42*	–.47*	–.07	–.04	–.00	–			
8. Extraversion	.76	.42*	.07	.07	–.18	.09	.14	.12	–		
9. Agreeableness	.70	–.04	.38*	.38*	–.11	–.00	.13	.28*	.23*	–	
10. Neuroticism	.83	–.27*	–.36*	–.36*	.16	.16	–.19*	–.30*	–.32*	–.27*	–
Mean		32.90	3.77	18.11	13.58	26.67	27.64	31.21	30.59	31.19	23.15
SD		7.48	.79	5.84	5.10	8.64	6.30	7.32	6.32	5.85	8.15

Notes: Higher scores for essay writer represent more positive assessments. The mean for mindful attention is at the item level.

* $p < .05$.

three-way interactions). To aid interpretation, we trimmed nonsignificant interaction terms.

In the final model, we entered Curiosity and Mindful Attention main effects and the binary Essay Condition (humans as similar versus distinct from other animals) and Induction (mortality salience versus dental pain) variables. In the second step, we added three two-way interactions: Curiosity × Mindful Attention, Curiosity × Essay, and Mindful Attention × Essay. In the final step, we added the three-way Curiosity × Mindful Attention × Essay interaction. Step one accounted for 8% of the variance in assessments of essay writers, step two accounted for another 4% of the variance, and the Curiosity × Mindful Attention × Essay interaction was statistically significant, $t(108) = 3.52, p < .001$, accounting for another 9% of the variance; see Table 2.

To interpret the three-way interaction, we created dummy-coded variables (0, 1) for the two essay conditions. When participants received the essay claiming that humans are unique, mindful attention failed to moderate the effect of curiosity on assessments of the essay writer ($p = .51$). Only individuals low in mindful attention and low in curiosity failed to positively evaluate the writer claiming that humans are unique. When participants received the essay claiming that humans are just another animal, mindful attention moderated the effect of curiosity on assessments of the

essay writer, $t = 4.00, p < .001$. Specifically, when curiosity was high, greater mindful attention was associated with greater positive assessments of the essay writer. The most positive evaluations came from individuals high in both qualities, and low in both qualities. Simple effects are represented in Fig. 1.

3.3. Construct specificity

To rule out alternative factors, we conducted a secondary analysis with the following covariates: self-esteem, political orientation, and the Big Five personality traits. The Curiosity × Mindful Attention × Essay Interaction remained statistically significant, $t(100) = 3.06, p = .003$, and none of the covariates significantly predicted assessment of the essay writer.

4. Discussion

The current study tested whether curiosity would enhance the role of mindful attention in ameliorating defensive responses to existential threat. We found partial support for this hypothesis. Using an essay suggesting that humans are nothing special and just another creature in the animal kingdom as an instigator of worldview defense, we found that highly curious and mindfully attentive

Table 2
Hierarchical regression model to predict assessment of essay writer.

Variables	β	SE	t -test	R^2
<i>Step 1:</i>				
Main effects				.08
Curiosity	1.39	.80	1.74	
Mindful attention	-.11	.82	-.14	
Essay condition	-2.75	1.59	-1.73	
Experimental condition	2.42	1.63	1.49	
<i>Step 2:</i>				
Two-way interactions				.12
Curiosity × Mindful Attention	1.68*	.81	2.08	
Curiosity × Essay Condition	.74	1.61	.46	
Mindful Attention × Essay Condition	-1.41	1.59	-.89	
<i>Step 3:</i>				
Three-way interaction				.21
Curiosity × Mindful Attention × Essay Condition	5.55***	3.52		

Notes:
* $p < .05$ unstandardized coefficient.
** $p < .01$ unstandardized coefficient.
*** $p < .001$ unstandardized coefficient.

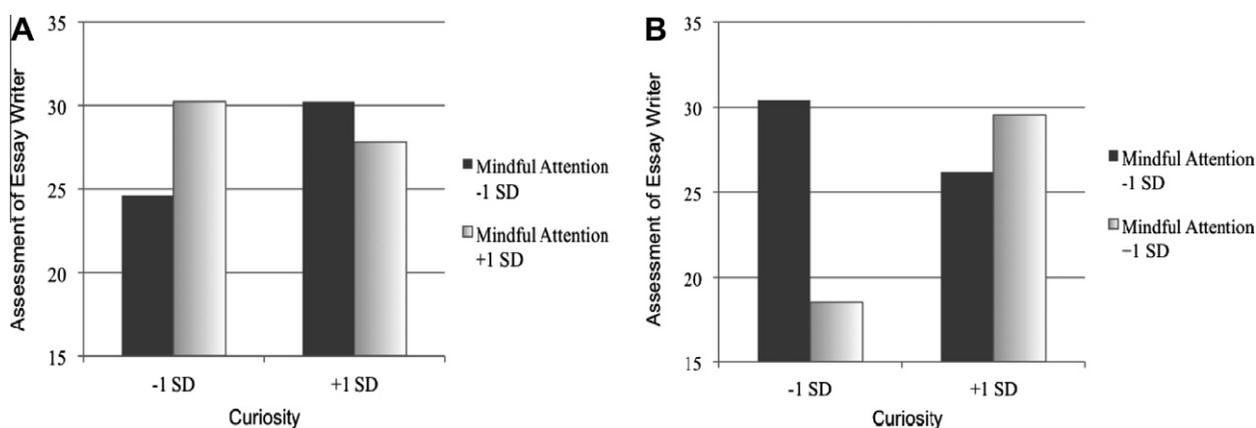


Fig. 1. Curiosity × Mindful Attention on positive assessments of essay writers. Notes: Decomposing Curiosity × Mindful Attention × Essay Condition interaction on positive assessment of essay writer ($p < .001$). Panels A and B reflect simple effects for Humans are Unique essay and Humans as Animals essay condition, respectively. Higher scores represent more positive assessments of writer.

people rated the writer as likeable, intelligent, and knowledgeable, with a valid viewpoint. We found similar non-defensive reactions from people that were lacking both curiosity and mindful attention. In contrast, people that were mindful but lacking curiosity tended to be defensive—operationalized as negative evaluations of the essay writer. Thus, to handle existential anxiety, the benefits of mindful attention appear to be enhanced by a curious stance toward novel, uncertain features of the world (Kashdan et al., 2009; Silvia & Kashdan, 2009).

Our findings add to a growing literature on how individual differences predict responses to threatened worldviews. Furthermore, our study adds to the incipient literature examining the role of mindfulness in terror management processes (Niemic et al., 2010). Regardless of whether people are asked to contemplate their mortality, being mindful and curious increases the likelihood of an open, receptive attitude toward people that challenge cultural values. A conscious, open, exploratory mode of mind appears to buffer against reflexive, defensive responding. This remained true even when controlling for alternative influences on defensive responding such as self-esteem, political orientation, and Big Five personality traits.

The most defensive individuals in our study, high in mindfulness but low in curiosity, reported a 39% reduction in their evaluations of essay writers in the worldview violating (compared to bolstering) condition. This fits with theory and research on anxiety. Being highly aware of the environment but incurious has conceptual overlap with core features of anxiety disorders—namely, hypervigilance and cognitive fusion (e.g., Hayes et al., 2006). If awareness serves a defensive, protection function to identify threats, as we find in people suffering from anxiety disorders (e.g., Ehlers & Clark, 2000), a lack of curiosity should influence downstream emotion regulation. This subset of anxious people might become more easily overwhelmed by stress and in turn, more likely to resort to defensive, maladaptive self-regulatory strategies such as excessive substance use, violence, or social isolation (Muraven & Baumeister, 2000). By contrast, when people encounter events with a curious mindset, characterized by differentiation of what is unique in the present moment without distortion, “individuals have a high tolerance for encountering experience without being threatened or defending against it” (Hodgins & Knee, 2002, pp. 88–89).

Unexpectedly, we found that mindlessness also mitigated worldview defense. People low in mindfulness and curiosity endorsed positive evaluations of writers detailing human beings as lacking special qualities that would differentiate them from other members of the animal kingdom. We believe that people with this mindless orientation failed to view these essays as personally threatening because they are less aware of their personal values and less agile in response to sociocultural factors. Mindlessness “involves accepting the stimulus as presented without trying to gather, absorb, or integrate new or novel information about the stimulus” (Carson, Shih, & Langer, 2001, p.184). Lacking context sensitivity, less mindful individuals probably did not notice the potential worldview threat resulting from the “humans are animals” essay.

We have evidence to suggest that there are characteristics that are unique to a mindless personality profile. Whereas individuals high in mindfulness but low in curiosity showed substantial variability in their evaluations of essay writers depending on the context (39% difference between worldview violating and bolstering essays), the mindless group lacked sensitivity to context (19% difference between worldview violating and bolstering essays). Findings for the mindless group are proposed to be a function of their non-reflective, non-contemplative approach to situations, and a tendency to be devoid of curious introspection. There is evidence to suggest that less mindful individuals are less interested in cog-

nitively challenging activities, and liable to be oblivious, passive, and uncritically accepting of information provided to them (Brown & Langer, 1990). Mindful people show evidence of cognitive flexibility whereas mindless people show evidence of automatic, rigid thinking that is governed by preconceived notions rather than what is unique in the present moment (Bishop et al., 2004). By definition, individuals with high levels of awareness in the present moment should show signs of context sensitivity. We found this, even when dispositional curiosity was relatively absent. Future studies can use think aloud, thought-listing, and other assessment techniques to address proposed mechanisms to account for the reactions of people higher and lower in mindfulness.

4.1. Limitations and future research

Several limitations deserve mention. First, findings from this single study deserve replication before firm conclusions can be drawn about the role of curiosity and mindfulness in defensive responses. This is particularly important because Niemic et al. (2010) found, in a series of well-controlled studies, that mindful attention alone was sufficient to ameliorate a variety of defensive responses in the face of existential threat. Second, Type II error was moderately high when considering the number of participants in our study relative to the number of constructs and analyses undertaken. Effect sizes should be given greater attention than the statistical significance levels of our analyses. Third, worldview defense can be measured in several ways and it will be important to examine the stability and generalizability of the current findings with other methods. Fourth, unlike prior studies with this paradigm (e.g., Goldenberg et al., 2001), we only found marginal support for the direct effect of mortality salience on responses to worldview violating essays. However, this trend toward significance should be qualified by our expectations of theoretically relevant individual differences as moderators of defensive responding to worldview threat. Fifth, of theoretic interest, mortality salience effects did not change as a function of individual differences in mindful attention, curiosity, or their combination. Perhaps the effects in this study, limited to individual differences at the dispositional level, will be different when the focus shifts to momentary experiences of mindfulness and curiosity and their influence on defensive responding. Additional work is needed using experimental inductions and other assessments with greater sensitivity than trait questionnaires. Finally, our manipulation of worldview defense might be less appropriate for many individuals and cultures whose values hinge on the connection between all living creatures on planet Earth and the lack of uniqueness of human beings. It will be important to address cultural variations in studying the relevance of mindfulness and curiosity to handling existential threats.

5. Conclusion

The current research suggests that being mindfully attentive with an attitude of curiosity operate in tandem to reduce defensive responding to a worldview threat. Mindful people show a willingness to consider new information about themselves and their world without reflexive judgments. In the absence of curiosity, mindfully attentive people appeared to be defensive, rejecting ideas and disparaging people that challenged the notion of human uniqueness. Yet mindfulness was not the only quality that mitigated defensive responding; similar results were found for mindlessness. Although mindful and mindless people both showed non-defensive reactions to ego threats, the proposed causal mechanisms are quite different. By explicitly addressing the interplay between curiosity and mindful attention, the current study

enhances our understanding of different modes of conscious processing in handling threatening events.

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