The Interactive Effect of Mental Contamination and Cognitive Fusion on Anxiety

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Abstract

Objectives: Mental contamination and cognitive fusion have been identified as risk factors for anxiety. The purpose of this study was to examine the moderating effect of cognitive fusion on the relationship between mental contamination and anxiety.

Method: Participants (N = 504 community adults), recruited via Amazon’s Mechanical Turk (MTurk), completed measures of mental contamination, cognitive fusion, and anxiety.

Results: Results from a regression analysis showed that the interaction between mental contamination and cognitive fusion predicted anxiety ($\beta = .15, p < .001$). Simple slopes analysis revealed a positive association between mental contamination and anxiety that was significant at higher ($\beta = .25, p < .001$), but not lower ($\beta = .01, p = .88$), levels of cognitive fusion.

Conclusion: The development of risk profiles that incorporate mental contamination and cognitive fusion may be beneficial for early identification of individuals at high risk for anxiety.

Keywords: anxiety, mental contamination, cognitive fusion, interaction, moderation
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Over 30% of the population of the United States will be afflicted with an anxiety disorder at some point in their lives (Kessler et al., 2005; Vilsaint et al, 2019). What’s more, recent data suggests that rates of anxiety are on the rise, having nearly tripled in 2020 during the coronavirus pandemic (Twenge & Joiner, 2020). Anxiety disorders are characterized not only by emotional suffering, but also physical health problems, poorer quality of life, and functional impairment (Hoffman, Dukes, & Wittchen, 2008). Moreover, experiencing anxiety symptoms is strongly related to comorbid depression and suicidal ideation, especially among women (Weiss, Simeonova, Kimmel, Battle, Maki & Flynn, 2016).

Although cognitive behavioral treatments for anxiety effectively reduce symptoms, approximately half of treatment completers do not achieve full remission (Springer, Levy & Tolin, 2018). It may be that theoretical accounts driving these treatments either a) fail to account for important risk factors or b) don’t accurately account for the complex relationships between risk factors; thereby causing these factors to go unaddressed in treatment. Both possibilities necessitate additional research to improve our understanding of the pathogenesis of anxiety. The identification of new constructs of interest or complex relationships between previously explored risk factors might allow intervention efforts to be adjusted accordingly.

Cognitive-Behavioral Models of Anxiety

Traditional cognitive-behavioral models of anxiety suggest that negative thoughts are triggered by specific events. In turn, these negative thoughts evoke emotional distress and the use of maladaptive coping (e.g., avoidant coping; Clark & Beck, 2010). The combination of emotional distress and subsequent maladaptive coping perpetuates anxiety symptoms.
Whereas earlier cognitive-behavioral models of anxiety emphasized the importance of maladaptive thought content, third-wave cognitive-behavioral models suggest that the relationship that the individual has with their thoughts is of primary importance (Hayes, 2016). Having a negative thought, even frequent intrusive negative thoughts, will not necessarily result in maladaptive outcomes. Instead, the way that one relates to these thoughts is more important for understanding when these thoughts will lead to maladaptive outcomes. Taken together, earlier cognitive behavioral models and more recent third-wave cognitive-behavioral models suggest that the content of one’s thoughts, as well as the way that one relates to their thoughts may be important for understanding the development and maintenance of anxiety. As such, the purpose of the present study was to examine the interplay between mental contamination, which triggers intrusive negative self-relevant thoughts, and cognitive fusion, a maladaptive form of relating to one’s thoughts, on anxiety.

**Mental Contamination**

Mental contamination refers to an internal sense of being dirty that occurs in the absence of physical contact with a contaminant (Coughtrey, Shafran, Lee, & Rachman, 2013; Rachman, 2004). Mental contamination may be evoked by (a) interactions with others that are undesirable or perceived as immoral in some way or (b) self-generated thoughts, memories, or perceptions that are unwanted or undesirable (Rachman, 2004; Krause, Wong, O’Meara, Aardema, & Radomsky, 2020). Mental contamination is believed to perpetuate psychopathology by triggering maladaptive beliefs and negative affective states. Specifically, the internal experience of dirtiness associated with mental contamination is interpreted as being self-relevant and meaningful (Krause et al., 2020). This leads to thoughts that one is unclean or immoral and that others will
notice (Herba & Rachman, 2007). Understandably, these thoughts, especially when intrusive and persistent, may lead to prolonged worry and fear (Herba & Rachman, 2007).

The effects of mental contamination on anxiety can be understood within a cognitive-behavioral framework. As described, instead of a physical contaminant, triggering events for mental contamination include undesirable interactions with others and/or internal cognitive events. In this model, mental contamination beliefs would then trigger anxious arousal and maladaptive attempts to cope.

Although much of the existing research on mental contamination has been conducted in relation to obsessive-compulsive disorder (Mathes et al., 2019), some have suggested that mental contamination may confer risk for other anxiety- and fear-related disorders (Blakely & Jacoby, 2018; Coughtrey et al., 2018). Some evidence supports this hypothesis. For example, medium-sized associations have been observed between mental contamination and posttraumatic stress symptoms (Badour et al., 2014; Fergus & Bardeen, 2016) and mental contamination and self-reported anxiety in cross-sectional research (Coughtrey, Shafran, Bennett, Kothari, & Wade, 2018; Melli et al., 2017). Both traditional cognitive-behavioral models and newer third-wave approaches suggest that maladaptive cognitions, such as those associated with mental contamination, precede anxious arousal. The temporal nature of the relationship between mental contamination and anxiety was examined by Coughtrey et al. (2014). They found that experimentally induced mental contamination led to increases in state anxiety. Finally, mental contamination has been shown to relate to several constructs that have been identified as risk factors for anxiety, including perfectionism, intolerance of uncertainty, fear of compassion (Coughtrey et al., 2018), and disgust propensity (Zanjani, Yaghubi, Shaeiri, Fata, & Fesharaki,
Taken together, these data support the continued exploration of mental contamination in the context of anxiety and related symptoms.

**Cognitive Fusion**

Third-wave cognitive-behavioral models may be useful when considering the effects of mental contamination on anxiety (Hayes, 2016). As described, third-wave models suggest that the way that one relates and responds to their thoughts may put one at risk for prolonged emotional distress and the subsequent development of anxiety. As such, cognitive fusion, a psychological phenomenon wherein the individual interprets their thoughts literally rather than viewing them as transient internal states, is one individual difference factor that might shed light on the conditions under which mental contamination contributes to anxiety (Gillanders et al., 2014). For example, a highly fused person who has an intrusive thought about a behavior that they perceive as immoral, may interpret that thought as evidence that they are immoral or “dirty”. The person then relies on fused thoughts to guide their behavior, which can result in functional impairment and may perpetuate anxiety symptoms. Fusion to one’s thoughts is particularly problematic when cognitive fusion is pervasive and inflexible (Hayes, 2016).

Cognitive fusion has shown itself to be a meaningful predictor of a wide range of anxiety and related symptoms, including trait anxiety (Bardeen & Fergus, 2016; Gillanders et al., 2014), social anxiety (Soltani, Hosseini, & Naghizadeh, 2018), health anxiety (Fergus, 2015), posttraumatic stress (PTS; Bardeen & Fergus, 2016), and obsessive-compulsive symptoms (Hellberg, Buchholz, Twohig, & Abramowitz, 2020; Reuman, Jacoby, & Abramowitz, 2016). Moreover, cognitive fusion has been shown to predict anxiety above and beyond key risk factors such as negative affect, experiential avoidance, and anxiety sensitivity (Fergus, 2015). Finally, cognitive fusion has been shown to moderate relations among transdiagnostic risk factors and
anxiety and related symptomatology. For example, cognitive fusion amplifies the effects of both negative posttraumatic cognitions and experiential avoidance on PTS symptoms (Benfer, Rogers, & Bardeen, 2020; Russel, Bardeen, Clayson, Dolan, & Fergus, 2020).

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In previous research, mental contamination inductions have led to increases in anxiety, as well as increases in the use of maladaptive avoidance behaviors that are known to alleviate emotional distress in the short-term, but maintain symptoms over prolonged periods (Coughtrey et al., 2014; Herba & Rachman, 2007). However, the moderating effect of cognitive fusion on the relationship between mental contamination and anxiety has yet to be examined. It may be that mental contamination is particularly problematic when coupled with high cognitive fusion. High fusion may increase the likelihood that the thoughts and emotions associated with mental contamination will be perceived as requiring urgent action, thereby increasing the likelihood that one will use maladaptive coping strategies that are known to prolong negative affective states and lead to clinical symptomatology.

As described, traditional cognitive-behavioral models provide a framework for understanding the role of mental contamination in the development of anxiety. Additionally, third wave cognitive-behavioral models suggest that how one relates to their thoughts may be particularly important for understanding the etiology of anxiety. As such, cognitive fusion may magnify the effect of mental contamination on anxiety and related behaviors. We hypothesized that the positive association between mental contamination and anxiety would be significantly stronger at higher, versus lower, levels of cognitive fusion.

Method

Participants and Procedure
Participants ($N = 504$) were recruited via Amazon’s Mechanical Turk (MTurk). MTurk has been shown to produce high quality data, and samples that are often more diverse than undergraduate samples (Buhrmester, Kwang, & Gosling, 2011; Casler, Bickel, & Hackett, 2013). As a quality control measure, only MTurk workers with at least a 95% approval rating were allowed to participate in this study. Recruitment was limited to participants between the ages of 18-64. The sample had an average age of 36.63 years ($SD = 11.82$, range $= 18-65$). The majority of the sample reported their race as White (79.6%), followed by Black or African American (8.1%), Asian (6.9%), Other (3.8%), American Indian or Alaska Native (.8%), and Native Hawaiian or other Pacific Islander (.8%). A minority of the sample reported their ethnicity as Hispanic or Latino (9.5%).

Participants could complete the study from any device with internet access. Participants received $1.50 in compensation upon study completion. This amount is comparable to MTurk studies of similar length (Buhrmester et al., 2011). All study procedures were approved by the local institutional review board.

**Measures**

Mental contamination was assessed using the 20-item Vancouver Obsessional Compulsive Inventory – Mental Contamination (VOCI-MC; Radomsky, Rachman, Shafran, Coughtrey, & Barber, 2014). Items are scored on a 5-point scale from 0 (*not at all*) to 4 (*very much*). The VOCI-MC has demonstrated excellent internal consistency and convergent validity with measures of contamination sensitivity and the contamination subscale of the VOCI in anxious samples (Radomsky et al., 2014). In the present study, the VOCI-MC ($M = 12.74$, $SD = 17.01$, range $= 0-80$) demonstrated adequate internal consistency ($\alpha = 0.97$).
Cognitive fusion was assessed using the 7-item Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014). CFQ items are scored on a 7-point scale from 1 (never true) to 7 (always true). Higher scores indicate greater cognitive fusion. The CFQ has demonstrated acceptable internal consistency and construct validity in past research (Gillanders et al., 2014). The CFQ ($M = 22.06$, $SD = 11.33$, range = 7-49) exhibited adequate internal consistency in the present study ($\alpha = 0.96$).

Anxiety symptoms were assessed using the Generalized Anxiety Disorder – 7 item scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006). Items refer to symptoms over the past two weeks and are scored on a 4-point scale from 0 (not at all) to 3 (nearly every day). The GAD-7 has demonstrated evidence of internal consistency and construct validity in past research (Mills et al., 2014; Spitzer et al., 2006). In the present study, GAD-7 scores ($M = 5.15$, $SD = 5.55$, range $= 0-21$) exhibited adequate internal consistency ($\alpha = 0.94$).

**Results**

**Outliers**

Six cases were identified as multivariate outliers and the approach suggested by Aguinis, Gottfredson, and Joo (2013) was used to determine whether any of these cases should be removed from the sample. Specifically, cases that exceeded a data-driven cutoff were removed from the sample one at a time and the primary analysis was repeated to determine the impact that each of these six cases had on the primary analysis. None of the six cases that were identified as multivariate outliers changed the pattern of the results described below. As such, the full sample was utilized in the final analysis.

**Data Analytic Plan**
Hierarchical regression was used to examine the moderating effect of cognitive fusion on the relationship between mental contamination and anxiety symptoms. Per Aiken and West (1991), the predictor (i.e., mental contamination) and moderator variables (i.e., cognitive fusion) were mean centered. Interaction terms were calculated as the product of the predictor and moderator variables. Mental contamination (VOCI-MC) and cognitive fusion (CFQ) were entered into the first step of the model. The centered interaction term was entered into the second step of the model (VOCI-MC X CFQ). Significant interaction effects were explored using simple slopes analysis (Aiken & West, 1991). Simple slopes analysis tests the effect of the predictor variable (VOCI-MC) at high (+1SD) and low (-1SD) values of the moderator (CFQ).

**Analysis**

In the first step of the regression model (adjusted $R^2 = .61, p < .001$), mental contamination and cognitive fusion significantly predicted GAD-7 anxiety ($\beta$s = .24 and .61, respectively, $ps < .001$). In the second step of the model ($\Delta R^2 = .01, p < .001$), the interaction between mental contamination and cognitive fusion significantly predicted GAD-7 Anxiety ($\beta = .15, p < .001$). Simple slopes analysis revealed a positive association between mental contamination and GAD-7 Anxiety that was significant at higher ($\beta = .25, p < .001$), but not lower ($\beta = .01, p = .88$), levels of cognitive fusion (Figure 1).

**Discussion**

The purpose of the present study was to examine the moderating effect of cognitive fusion on the relationship between mental contamination and anxiety. As hypothesized, mental contamination was positively associated with anxiety symptoms, but only at higher levels of cognitive fusion. Thus, it appears that mental contamination alone might not lead to anxiety. Instead, it is only when mental contamination is coupled with cognitive fusion that a significant
relationship emerges. This moderation effect might help to explain why a significant association between mental contamination and generalized anxiety symptoms was not established in previous research (Coughtrey, Shafran, Knibbs, & Rachman, 2012).

Contamination beliefs are largely unaddressed in existing theoretical models of anxiety. However, there is considerable attention paid to the role of maladaptive thinking more generally. For example, Clark and Beck’s cognitive model of anxiety (2010) suggests that antecedent events are followed by negative interpretations, which lead to negative affect and maladaptive coping. In the case of mental contamination, the antecedent event is an internal representation rather than a physical contaminant. As described, antecedent events to mental contamination might include an interaction with another person that is unwanted, or an undesirable thought, memory, or image, that triggers beliefs about mental contamination. Importantly, the results of the present study suggest that mental contamination is not associated with anxiety in the absence of cognitive fusion. Thus, without consideration of cognitive fusion, mental contamination’s influence on the development of anxiety may be relatively limited. The theoretical explanation for this phenomenon is that those who are more strongly fused to contamination-related thoughts are more likely to view these thoughts as literal truths rather than transient internal states.

The results of the present study may have important clinical implications. Cognitive-models of anxiety suggest that the content of one’s thoughts play a fundamental role in our understanding and treatment of anxiety-related pathology (Clark & Beck, 2010; Hofmann, Asmundson & Beck, 2013). In contrast, third wave or functional-contextual models of anxiety deemphasize the content of one’s thoughts, and place more importance on how one relates to such thoughts (Hayes, 2016; Herbert & Forman, 2013). The results of the present study suggest that the content of one’s thoughts may be relatively unimportant for predicting the development
of anxiety in the absence of relating to such thoughts in a highly fused manner. In addition, whereas a cognitive therapist may teach a client to identify and alter the content of mental-contamination-related thoughts, a therapist from a functional-contextual perspective would help the client change their relationship to these uncomfortable thoughts, while also encouraging the client to engage in value-driven behavior. The results of the present study suggest that the latter approach may be more appropriate for those with higher levels of mental contamination and cognitive fusion. This perspective is consistent with evidence that reductions in cognitive fusion explain the effect of cognitive-behavioral therapy on improvements in anxiety-related outcomes (i.e., worry and behavioral avoidance; Arch, Wolitzky-Taylor, Eifert, & Craske, 2012).

Study limitations must be acknowledged. The cross-sectional nature of this study precludes the examination of causal relationships among mental contamination, cognitive fusion, and anxiety. Although empirical evidence suggests that both mental contamination and cognitive fusion precede anxiety in the temporal chain of events (Coughtrey et al., 2014; Krafft, Haeger, & Levin, 2019), it will be important to conduct longitudinal and experimental research to confirm the temporal relations among the variables of interest in this study. Additionally, the sample used in the present study consisted of unselected community adults, which limits the generalizability of study findings. Thus, confirmation of study findings in a clinical sample may be of value in future research. Evidence suggests that endorsement of constructs related to contamination may vary as a function of ethno-racial differences. For example, participants who identify as African American or Black report higher levels of contamination anxiety compared to those who identify as European American or White (Williams, Turkheimer, Magee, & Guterbock, 2008).

Unfortunately, we were unable to examine the influence of race and ethnicity on the results of the present study because the large majority of the sample identified as White and non-Hispanic.
It may be important to consider the influence of ethno-racial differences in this line of research in the future. Lastly, because mental contamination and cognitive fusion have been suggested as transdiagnostic risk factors across anxiety disorders (Blakely & Jacoby, 2018; Coughtrey et al., 2018), it will be important to examine the observed interaction effect in relation to multiple forms of anxiety pathology in future research.

Findings from the present study provide an important initial step in identifying risk profiles (i.e., high levels of mental contamination and cognitive fusion) for individuals that may be at particularly high risk of developing anxiety. Given the emotional, economic, and social burden associated with anxiety disorders (Hoffman et al., 2008), identifying those who are at high risk is important. Through institution-wide screenings (e.g., brief mental health screenings administered in education and work settings) it may be possible to identify those at risk before clinically significant anxiety has developed. These individuals could be given the option of receiving early intervention. The development of an early screening procedure and treatment designed for individuals with high mental contamination and cognitive fusion may be helpful in reducing anxiety pathology.
References


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Figure 1. Interactive effect of mental contamination (VOCI-MC) and cognitive fusion (CFQ) on anxiety symptoms (GAD-7).