Examining the Incremental Contribution of Metacognitive Beliefs Beyond Content-Specific Beliefs in Relation to Posttraumatic Stress in a Community Sample

Thomas A. Fergus
Baylor University

Joseph R. Bardeen
Auburn University

Objective: Cognitive-behavioral models of posttraumatic stress disorder (PTSD) propose that the content of one’s thoughts, including negative beliefs about the self, others, and world, play a fundamental role in our understanding and treatment of PTSD. Metacognitive theory suggests that metacognitive beliefs (i.e., beliefs about thinking), rather than content-specific beliefs, underlie PTSD. The present study provided the first known examination of the incremental contribution of metacognitive beliefs and trauma-related cognitions in relation to posttraumatic stress. Method: Community adults recruited through an online crowdsourcing website who reported experiencing a criterion A traumatic event (N = 299) completed self-report measures of the study variables. Results: Results from multiple linear regression analyses indicated that metacognitive beliefs of the uncontrollability and danger of thinking shared associations with each posttraumatic stress symptom cluster after accounting for the effects of content-specific beliefs and other covariates. The individual content-specific beliefs did not consistently share associations with posttraumatic stress symptoms in the regression analyses. The contribution of the individual content-specific beliefs to posttraumatic stress symptoms was consistently attenuated or rendered nonsignificant after accounting for metacognitive beliefs. Conclusions: These results are consistent with metacognitive theory in suggesting that metacognitive beliefs may be more important than trauma-related thought content in relation to posttraumatic stress.

Keywords: cognition, metacognition, posttraumatic traumatic stress disorder, PTSD

Cognitive-behavioral models of posttraumatic stress disorder (PTSD) propose that the content of one’s thoughts, including negative beliefs about the self, others, and world, play a fundamental role in our understanding and treatment of PTSD (e.g., Ehlers & Clark, 2000; Foa & Rothbaum, 1998). For example, an individual who experiences a traumatic event and has the belief that the world is an entirely dangerous place is likely to overestimate the threat value of trauma-related cues, thus increasing emotional distress and resulting in the chronic use of maladaptive avoidance behaviors that do not allow for emotional processing (Ehlers & Clark, 2000; Foa & Rothbaum, 1998). The importance given to negative beliefs about the self, others, and world in cognitive-behavioral models is supported by extant data indicating that those content-specific beliefs share robust cross-sectional and prospective associations with posttraumatic stress symptoms (e.g., Bryant & Guthrie, 2007; Ehlers, Ehring, & Glucksman, 2008; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999; Kleim, Ehlers, & Glucksman, 2007; O’Donnell, Elliott, Wolfgang, & Creamer, 2007). Moreover, those beliefs may be a possible mechanism of change for cognitive-behavioral therapies for PTSD (e.g., Gallagher & Resick, 2012; Kleim et al., 2013; Kumpula et al., 2016).

Whereas cognitive-behavioral models have led to substantive advances in our understanding and treatment of PTSD, other conceptual models of PTSD place less emphasis on the specific content of thoughts. Consider Wells’s metacognitive model of PTSD (Wells, 2009; Wells & Sembi, 2004a), which posits that most individuals will experience negative beliefs about the self, others, and world following trauma exposure. Yet, the majority of trauma survivors do not develop PTSD. Wells (2009) opines that thought content does not underlie PTSD. Rather, PTSD occurs as the result of how individuals respond to thoughts and other inner experiences, such that PTSD arises when individuals respond to inner experiences (e.g., intrusive images, memories) with rumination, worry, or other avoidant coping strategies that make up the cognitive attentional syndrome (CAS). The CAS is maladaptive because it increases and maintains threat perceptions and blocks emotional processing (Wells, 2009; Wells & Sembi, 2004a).

Within Wells’s metacognitive model of PTSD (Wells, 2009; Wells & Sembi, 2004a), posttraumatic stress symptoms are viewed as a normative part of an adaptation process in the acute aftermath of trauma exposure. Following trauma exposure, the CAS is initiated in response to posttraumatic stress symptoms among individuals who hold certain metacognitive beliefs (i.e., beliefs about thinking). Metacognitive beliefs are typically separated into posi-
tive metacognitive beliefs (e.g., “worrying will keep me safe”) and negative metacognitive beliefs (e.g., “difficulty controlling what I think about means that I am going crazy”), respectively. Holding positive metacognitive beliefs leads to the use of avoidant coping methods following trauma exposure. The nonoccurrence of feared outcomes strengthens positive metacognitive beliefs and the CAS. Holding negative metacognitive beliefs leads individuals to experience their thought processes as distressing. For example, concern about losing control of thoughts following trauma exposure may increase the degree to which one monitors his or her stream of consciousness for cognitive events that support original concerns (i.e., losing control). Such monitoring may increase the likelihood that those cognitive events are brought into awareness, rather than going unnoticed. Individuals may consequently engage in even greater avoidant coping to mitigate the resulting distress, which further strengthens metacognitive beliefs and the CAS. The cycle is terminated, and emotional processing ultimately occurs, through the alteration of metacognitive beliefs (Wells, 2009; Wells & Sembi, 2004a). Cognitive-behavioral models of PTSD implicate the role of beliefs that could be conceptualized as metacognitive in nature (e.g., “If I think about the trauma, I will go mad,” Ehlers & Clark, 2000). However, those models do not separate metacognitive beliefs from content-specific beliefs.1

Two prior studies examined associations between metacognitive beliefs and posttraumatic stress symptoms using the short-form of the Metacognitions Questionnaire (MCQ-30; Wells & Cartwright-Hatton, 2004). In these studies, positive and negative metacognitive beliefs shared inconsistent associations with posttraumatic stress symptoms (r values of .01—.35; Bennett & Wells, 2010; Roussis & Wells, 2006). The MCQ-30 seems best described as a general measure of metacognitive beliefs in the context of the present research because the MCQ-30 was not developed to assess metacognitive beliefs that may be particularly relevant to PTSD. Fortunately, Wells (2009) developed a self-report measure that assesses metacognitive beliefs in the context of PTSD. No known published study has yet examined associations between metacognitive beliefs and posttraumatic stress symptoms using Wells’s (2009) measure.

Additionally, the contribution of metacognitive beliefs and content-specific beliefs has been simultaneously considered in relation to symptom presentations other than posttraumatic stress (e.g., Myers, Fisher, & Wells, 2008; Myers & Wells, 2005). Those studies found that metacognitive beliefs contribute to symptoms beyond the effects of content-specific beliefs. In fact, content-specific beliefs rarely share unique variance with symptoms after accounting for metacognitive beliefs (Myers et al., 2008; Myers & Wells, 2005).

The purpose of the present study was to provide the first known examination of the incremental contribution of metacognitive beliefs and content-specific beliefs to posttraumatic stress symptoms. To ensure that Wells’s (2009) 12-item metacognitive belief measure assesses both positive and negative metacognitive beliefs as distinct constructs, we examined the factor structure of the measure before including it in our primary analysis. We predicted that the resulting metacognitive beliefs would positively correlate with posttraumatic stress symptoms. Based on previous research with other symptom presentations (e.g., Myers et al., 2008; Myers & Wells, 2005), we further predicted that metacognitive beliefs would account for unique variance in posttraumatic stress symptoms beyond content-specific beliefs.

Two sets of content-specific trauma beliefs (Foa et al., 1999; Vogt, Shiperd, & Resick, 2012) were used to ensure study findings were not due to idiosyncrasies of one set of content-specific beliefs. Additionally, covariates (i.e., gender, depression, anxiety, stress) were included in multivariate analyses to be consistent with prior examinations of the incremental contribution of content-specific beliefs (e.g., Moser, Hajcak, Simons, & Foa, 2007). Following Moser et al. (2007), depression, anxiety, and stress were examined separately rather than using a total score of general affective distress. In addition to our somatic marker of anxiety, we included a measure of worry as a covariate to address the cognitive aspects of anxiety. Accounting for the effect of cognitive anxiety is important in the present study because prior findings indicate that worry may impact the relation between metacognition and posttraumatic stress (Roussis & Wells, 2006).

Method

Participants

A total of 504 adults recruited from across the United States through an online crowdsourcing website completed study measures. To be included in the present study, participants had to report exposure to actual or threatened death, serious injury, or sexual violence on the Life Events Checklist for Diagnostic and Statistical Manual of Mental Disorders—5 (LEC-5; Weathers et al., 2013a). A total of 299 adults met the inclusion criteria. The sample primarily consisted of women (60.4%). The sample was primarily White (83.9%) and not Hispanic or Latino (91.6%). Approximately 7.7% of the sample self-identified as African American, 4.7% as Asian, and 3.7% as “other.” The majority of respondents received an associate degree or higher (84.3%), and the median household income was between $40,000 and $49,999. Respondents self-identified as retired (2.0%), a student (4.6%), unemployed (7.5%), a homemaker (8.7%), or employed at least part time (77.2%).

Measures

LEC-5. The LEC-5 (Weathers et al., 2013a) is a self-report measure that assesses trauma exposure. Participants are provided with a list of 17 potentially traumatic events (e.g., sexual assault, motor vehicle accident, combat). For each event, respondents indicate if the event directly happened to them, they witnessed it, they learned about it, it was part of their job, they are unsure, or the event did not apply to them. Consistent with Bovin et al. (2016), an extended version of the LEC-5 that provides more detail about participants’ distressing event (i.e., exposure to actual or threatened death, serious injury, or sexual violence) was used to determine if participants met criterion A. Participants were asked to reference the one event that currently bothered them the most when completing the follow-up measure of posttraumatic stress.

---

1 We thank an anonymous reviewer for drawing our attention to this point.
symptoms. The most commonly reported events were transportation accident (n = 49, 16.4%), sudden accidental death (n = 39, 13.0%), sexual assault (n = 34, 11.4%), natural disaster (n = 32, 10.7%), physical assault (n = 31, 10.4%), sudden violent death (n = 25, 8.4%), and life-threatening illness or injury (n = 23, 7.7%). A complete listing of the most distressing LEC-5 event is available from the corresponding author.

PTSD Checklist-5-Civilian Version. The PTSD Checklist-5-Civilian Version (PCL-5; Weathers et al., 2013b) is a 20-item self-report measure designed to assess DSM-5 PTSD criteria B, C, D, and E. PCL-5 scores include a total score, as well as intrusion, avoidance, cognition, and arousal symptom scores (Blevins, Weathers, Davis, Witte, & Domino, 2015). Participants were instructed to indicate the extent to which they experienced each symptom in the past month in relation to their LEC-5 target event. PCL-5 responses are rated using a 0 to 4 scale, with higher scores indicating greater symptoms. Consistent with evidence suggesting that PTSD is not a discrete clinical syndrome, but rather a dimensional construct (e.g., Broman-Fulks et al., 2006), PCL-5 items were summed to create an overall total score and symptom scores for use as continuous variables in subsequent analyses. The PCL-5 scales (total: M = 17.69, SD = 17.94, Cronbach’s alpha = .96; intrusion: M = 4.65, SD = 4.84, α = .92; avoidance: M = 2.40, SD = 2.51, α = .90; cognition: M = 5.79, SD = 7.03, α = .93; arousal: M = 4.85, SD = 5.39, α = .88) showed adequate internal consistency in this study. Using a PCL-5 cutoff score of 37 (see Blevins et al., 2015), approximately 18.4% (n = 55) of trauma-exposed participants and 10.9% of the entire sample reported the presence of clinically relevant posttraumatic stress symptoms.

Metacognitions Questionnaire-PTSD. The Metacognitions Questionnaire-PTSD (MCQ-PTSD; Wells, 2009) is a subset of 12 items that are part of Wells’s (2009) Posttraumatic Stress Disorder Scale (PTSD-S), which was developed for monitoring treatment progress. Items to the metacognitive belief items are rated using a 0 to 100 scale (increments of 10), with higher scores indicating more strongly held beliefs. Based upon the item content, it was expected that the MCQ-PTSD would consist of five positive metacognitive beliefs (e.g., “Thinking about threats in the future will help me cope”) and seven negative metacognitive beliefs (e.g., “I have lost control of my thoughts”).

Posttraumatic Cognitions Inventory. The Posttraumatic Cognitions Inventory (PTCI; Foa et al., 1999) is a 36-item measure that assesses content-specific trauma beliefs about self (e.g., “I can’t trust that I will do the right thing”), world (e.g., “I have to be on guard all the time”), and self-blame (e.g., “The event happened because of the way I acted”), respectively. Items are rated using a 1 to 7 scale, with higher scores indicating more strongly held beliefs. Following Foa et al. (1999), scale averages were calculated. The PTCI shares small-to-large correlations (r values ranging from .20 to .74) with another measure of content-based beliefs and a large correlation (r = .79) with a measure of posttraumatic stress symptoms (Foa et al., 1999). Negative cognitions about self (M = 2.19, SD = 1.40, α = .97), negative cognitions about the world (M = 3.60, SD = 1.69, α = .92), and self-blame (M = 2.07, SD = 1.39, α = .89) showed adequate internal consistency in this study.

Posttraumatic Maladaptive Beliefs Scale. The Posttraumatic Maladaptive Beliefs Scale (PMBS; Vogt et al., 2012) is a 15-item measure that assesses the content-specific trauma beliefs of threat of harm (e.g., “I don’t feel safe anywhere anymore”), self-worth and judgment (e.g., “I have lost respect for myself”), and reliability and trustworthiness of others (e.g., “Most people are basically caring,” reverse-keyed). Items are rated on a 1 to 7 scale, with higher scores indicating more strongly held beliefs. The PMBS shares small-to-medium correlations with another measure of content-based beliefs (r values ranging from .20 to .35) and a medium-to-large correlation (r = .49) with a measure of posttraumatic stress symptoms (Vogt et al., 2012). Threat of harm (M = 15.26, SD = 7.38, α = .86), self-worth and judgment (M = 12.92, SD = 6.43, α = .83), and reliability and trustworthiness of others (M = 14.21, SD = 6.73, α = .83) showed adequate internal consistency in this study.

Depression Anxiety Stress Scales-21. The Depression Anxiety Stress Scales-21 (DASS-21; Lovibond & Lovibond, 1995) is a 21-item short form of the 42-item DASS (Lovibond & Lovibond, 1995) that assesses depression (e.g., “I couldn’t seem to experience any positive feeling at all”), anxiety (e.g., “I felt I was close to panic”), and stress (e.g., “I tended to over-react to situations”) over the past week. Items are rated using a 0 to 3 scale, with higher scores indicating greater symptom severity. The DASS-21 shares large correlations with other measures of depression (r = .79), anxiety (r = .85), and stress (r = .68), respectively (Antony, Bieling, Cox, Enns, & Swinson, 1998). Depression (M = 4.54, SD = 5.59, α = .94), anxiety (M = 3.45, SD = 4.46, α = .90), and stress (M = 5.16, SD = 5.12, α = .91) showed adequate internal consistency in this study.

Penn State Worry Questionnaire-A Abbreviated. The Penn State Worry Questionnaire-A Abbreviated (PSWQ-A; Hopko et al., 2003) is an 8-item short-form of the 16-item PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) that assesses worry (e.g., “My worries overwhelm me”). Items are rated on a 1 to 5 scale, with higher scores indicating greater worry. The PSWQ-A shares medium-to-large correlations with other indices of anxiety (r values of .39 and .51), and those correlations are statistically equivalent to those found using the full-length PSWQ (Kertz, Lee, & Bjorgvinsson, 2014). The PSWQ-A (M = 20.37, SD = 10.27, α = .97) showed adequate internal consistency in this study.

Procedure

Participants were recruited using Amazon’s Mechanical Turk (MTurk), an Internet-based platform that allows individuals to request the completion of jobs (e.g., survey completion) for monetary compensation. Respondents completing surveys through MTurk have been found to produce high quality data and tend to be more demographically diverse than other Internet samples or undergraduate samples (see Chandler & Shapiro, 2016, for a review). The present research was approved by the local institutional review board. Recruitment was limited to MTurk workers over 18 years of age and located in the United States. We followed findings from Peer, Vosgerau, and Acquisti (2014) and sought to improve data quality by restricting MTurk worker approval ratings. Worker specifications included restricting participation to MTurk workers who had approval ratings above 95% (Peer et al., 2014). Participants were required to provide electronic consent, and there was no penalty for withdrawing from the study. Study measure completion was randomized. Upon study completion, participants were debriefed and paid in full. Compensation was...
$1.50, an amount consistent with compensation given to MTurk workers completing prior studies of similar length (Buhrmester, Kwang, & Gosling, 2011).

Results

MCQ-PTSD

The first four eigenvalues from the exploratory factor analysis (EFA) were 5.15, 1.81, 1.06, and 0.82. Parallel analysis (Horn, 1965; O’Connor, 2000), which represents one of the most accurate methods of factor retention (Zwick & Velicer, 1986), was used to determine the appropriate amount of factors to extract from the MCQ-PTSD. Parallel analysis identifies the number of factors from the present EFA data that account for more variance than factors derived from random data. Parallel analysis is considered a preferred method for determining factor retention compared with other methods (e.g., eigenvalue rule, scree plot examination; Zwick & Velicer, 1986). Parallel analysis for both mean and 95th percentile eigenvalues indicated the appropriateness of a two-factor solution. The subsequent EFA consisted of extracting two factors using principal axis factoring with direct oblimin rotation. Items were considered to have salient loadings if their factor loadings were greater than |.40| (Thurstone, 1947).

Items, factor loadings, and communalities from the EFA are presented in Table 1. As shown, the seven negative metacognitive beliefs loaded on one factor and the five positive metacognitive beliefs loaded on a second factor. There were no salient cross-loadings. The communalities were, for the most part, moderate, suggesting a fair amount of homogeneity among the items loading.

Table 1

Exploratory Factor Analysis Results of the Metacognitions Questionnaire-PTSD (MCQ-PTSD)

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor I</th>
<th>Factor II</th>
<th>h²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I must go over events to make sense of them.</td>
<td>.08</td>
<td>.65</td>
<td>.49</td>
</tr>
<tr>
<td>2. It is important not to have gaps in my memory.</td>
<td>.01</td>
<td>.63</td>
<td>.41</td>
</tr>
<tr>
<td>3. Thinking about threats in the future will help me cope.</td>
<td>−.03</td>
<td>.85</td>
<td>.70</td>
</tr>
<tr>
<td>4. Worrying will keep me safe.</td>
<td>.12</td>
<td>.59</td>
<td>.42</td>
</tr>
<tr>
<td>5. Paying attention to danger will keep me safe.</td>
<td>−.07</td>
<td>.56</td>
<td>.28</td>
</tr>
<tr>
<td>6. I must stop thinking about what happened.</td>
<td>.48</td>
<td>.08</td>
<td>.27</td>
</tr>
<tr>
<td>7. It’s not normal to keep thinking about the trauma.</td>
<td>.46</td>
<td>.05</td>
<td>.23</td>
</tr>
<tr>
<td>8. I must be weak to respond like this.</td>
<td>.79</td>
<td>−.07</td>
<td>.57</td>
</tr>
<tr>
<td>9. I could lose my mind if I continue to think this way.</td>
<td>.83</td>
<td>−.02</td>
<td>.67</td>
</tr>
<tr>
<td>10. I’ll never be normal again.</td>
<td>.83</td>
<td>−.02</td>
<td>.68</td>
</tr>
<tr>
<td>11. My mind has been damaged by what happened.</td>
<td>.77</td>
<td>.06</td>
<td>.64</td>
</tr>
<tr>
<td>12. I have lost control of my thoughts.</td>
<td>.85</td>
<td>−.04</td>
<td>.68</td>
</tr>
</tbody>
</table>

Note. N = 299. Factor I = negative metacognitive beliefs; Factor II = positive metacognitive beliefs. Items reprinted with permission from the publisher, Guilford Press.

Metacognitive Beliefs and Posttraumatic Stress Symptoms

Zero-order correlations among the study variables are presented in Table 2. The positive and negative metacognitive beliefs shared medium-to-large correlations with posttraumatic stress symptoms. Among those beliefs, negative metacognitive beliefs clustered particularly strongly with posttraumatic stress symptoms. Positive metacognitive beliefs shared small-to-medium correlations with the content-specific beliefs, whereas negative metacognitive beliefs shared medium-to-large correlations with the content-specific beliefs. The highest variance inflation factor (VIF) was 6.8 (PTCI-Self), which is below conventional cutoffs (i.e., 10) for indicating problems with multicollinearity (Cohen, Cohen, West, & Aiken, 2003).

Next, hierarchical multiple linear regression analyses were used to further examine associations between the respective beliefs and posttraumatic stress symptoms. Each model had one of the PCL-5 scales (total score and four cluster scores) as the criterion variable. Covariates were entered into Step 1 of each model, the respective set of content-specific beliefs were entered into Step 2, and metacognitive beliefs were entered into Step 3. In total, 10 regression models were examined. The PTCI content-specific beliefs were entered into step 2 of five regression models and the PMBS content-specific beliefs were entered into step 2 of five of the models. The False Discovery Rate (FDR; Benjamini & Hochberg, 1995) was used to address the increase in Type I error that can result from simultaneously conducting 10 regression analyses. FDR results indicated that a familywise alpha of .009 should be used in regression analyses.

Regression results are presented in Table 3 (using the PTCI content-specific beliefs) and Table 4 (using the PMBS content-specific beliefs), respectively. As predicted, metacognitive beliefs accounted for unique variance in posttraumatic stress symptom scores beyond the covariates and the respective content-based beliefs. Negative metacognitive beliefs were the only beliefs (content-specific or metacognitive) to share an association with each PCL-5 scale score. Although the three PTCI content-specific beliefs collectively accounted for unique variance in posttraumatic symptom scores beyond the covariates, negative cognitions about self shared an association with only two, of the five, PCL-5 scale scores after accounting for metacognitive beliefs. Negative cognitions about the world shared an association with only one of the five, PCL-5 scale scores after accounting for metacognitive beliefs. Although the PMBS content-specific beliefs collectively accounted for unique variance in posttraumatic symptom scores beyond the covariates, threat of harm shared an association with only one, of the five, PCL-5 scales after accounting for metacog-

2 We thank an anonymous reviewer for raising the possibility that some of the negative metacognitive belief items of the MCQ-PTSD could be construed as content-specific beliefs. We reran analyses removing MCQ-PTSD items 8, 10, and 11. Results from the factor analysis still indicated an interpretable two-factor solution and the pattern of associations with metacognitive beliefs remained unchanged. We retained those three MCQ-PTSD items for the reported analyses to be consistent with Wells’s (2009) conceptualization.
Table 2
Zero-Order Correlations Among Study Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MCQ-PTSD-Positive</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. MCQ-PTSD-Negative</td>
<td>.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. PTCI-Self</td>
<td>.47</td>
<td>.66</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. PTCI-World</td>
<td>.40</td>
<td>.53</td>
<td>.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. PTCI-Blame</td>
<td>.44</td>
<td>.48</td>
<td>.74</td>
<td>.48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. PMBS-Threat of Harm</td>
<td>.45</td>
<td>.63</td>
<td>.78</td>
<td>.83</td>
<td>.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. PMBS-Self-Worth/Judgment</td>
<td>.44</td>
<td>.52</td>
<td>.78</td>
<td>.52</td>
<td>.60</td>
<td>.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. PMBS-Reliability/Trustworthiness</td>
<td>.23</td>
<td>.33</td>
<td>.46</td>
<td>.51</td>
<td>.31</td>
<td>.53</td>
<td>.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. PCL-5-Total</td>
<td>.30</td>
<td>.55</td>
<td>.74</td>
<td>.57</td>
<td>.56</td>
<td>.64</td>
<td>.56</td>
<td>.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. PCL-5-Intrusion</td>
<td>.21</td>
<td>.43</td>
<td>.55</td>
<td>.45</td>
<td>.42</td>
<td>.50</td>
<td>.40</td>
<td>.24</td>
<td>.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. PCL-5-Avoidance</td>
<td>.20</td>
<td>.38</td>
<td>.49</td>
<td>.47</td>
<td>.37</td>
<td>.45</td>
<td>.39</td>
<td>.20</td>
<td>.81</td>
<td>.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. PCL-5-Cognition</td>
<td>.32</td>
<td>.52</td>
<td>.79</td>
<td>.54</td>
<td>.61</td>
<td>.64</td>
<td>.60</td>
<td>.37</td>
<td>.94</td>
<td>.76</td>
<td>.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. PCL-5-Arousal</td>
<td>.30</td>
<td>.57</td>
<td>.71</td>
<td>.57</td>
<td>.51</td>
<td>.63</td>
<td>.54</td>
<td>.37</td>
<td>.92</td>
<td>.74</td>
<td>.65</td>
<td>.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. DASS-21-Depression</td>
<td>.43</td>
<td>.65</td>
<td>.80</td>
<td>.53</td>
<td>.51</td>
<td>.61</td>
<td>.73</td>
<td>.41</td>
<td>.63</td>
<td>.48</td>
<td>.45</td>
<td>.65</td>
<td>.61</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. DASS-21-Anxiety</td>
<td>.43</td>
<td>.68</td>
<td>.71</td>
<td>.47</td>
<td>.51</td>
<td>.56</td>
<td>.60</td>
<td>.34</td>
<td>.62</td>
<td>.52</td>
<td>.44</td>
<td>.59</td>
<td>.63</td>
<td>.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. DASS-21-Stress</td>
<td>.46</td>
<td>.70</td>
<td>.70</td>
<td>.57</td>
<td>.47</td>
<td>.60</td>
<td>.64</td>
<td>.37</td>
<td>.63</td>
<td>.52</td>
<td>.46</td>
<td>.58</td>
<td>.66</td>
<td>.79</td>
<td>.77</td>
<td></td>
</tr>
<tr>
<td>17. PSWQ-A</td>
<td>.54</td>
<td>.80</td>
<td>.65</td>
<td>.56</td>
<td>.42</td>
<td>.60</td>
<td>.64</td>
<td>.31</td>
<td>.56</td>
<td>.44</td>
<td>.40</td>
<td>.55</td>
<td>.55</td>
<td>.64</td>
<td>.59</td>
<td>.68</td>
</tr>
</tbody>
</table>

Note. N = 299. All values significant at p < .05 (two-tailed). MCQ = Metacognitions Questionnaire; PTCI = Posttraumatic Cognitions Inventory; PMBS = Posttraumatic Maladaptive Beliefs Scale; PCL = PTSD Checklist; DASS = Depression Anxiety Stress Scales; PSWQ-A = Penn State Worry Questionnaire-Abbreviated.

Discussion

To date, prior research has only examined how general metacognitive beliefs relate to posttraumatic stress symptoms and found inconsistent relations. Through the use of a measure of metacognitive beliefs that may be more applicable to PTSD, the present results indicate medium-to-large associations among metacognitive beliefs and posttraumatic stress symptoms. Among the metacognitive beliefs, negative metacognitive beliefs, representing a lack of control over thoughts, clustered particularly strongly with posttraumatic stress. Further highlighting the importance of metacognitive beliefs to posttraumatic stress, metacognitive beliefs accounted for unique variance in posttraumatic stress symptom scores beyond the effects of covariates and content-specific beliefs. Associations between content-specific beliefs and posttraumatic stress symptoms were consistently attenuated or rendered nonsignificant after accounting for metacognitive beliefs.

Roussis and Wells (2006) previously found that the association between positive metacognitive beliefs and posttraumatic stress symptoms was accounted for by the tendency to use worry as a thought control strategy, whereas negative metacognitive beliefs...
had a direct effect on posttraumatic stress symptoms independent of worry. This prior study used a general measure of metacognitive beliefs, whereas a measure of metacognitive beliefs specifically relevant to PTSD was used in the present study. Nonetheless, the present results are consistent with those found by Rouissis and Wells (2006) as negative metacognitive beliefs shared the most robust association with posttraumatic stress symptoms in the present study. Of note, prior research has found that negative metacognitive beliefs are related to both anxiety levels and negative meta-cognitive beliefs more strongly with other indices of anxiety (Wells & Cartwright-Hatton, 2004). Negative metacognitive beliefs (e.g., “I could lose my mind if I continue to think this way,” Wells, 2009) may also have a particularly strong impact on posttraumatic stress symptoms, as those beliefs are less likely to lead to threatening interpretations of symptoms (e.g., intrusive images, memories) that in turn serve to lead to greater emotional distress and maladaptive avoidance (Wells, 2009; Wells & Sembi, 2004a).

The incremental contribution of negative metacognitive beliefs to posttraumatic stress symptoms beyond content-specific beliefs is notable. Such a pattern of findings converges with prior findings indicating that metacognitive beliefs contribute to our understanding of other symptom types beyond the effects of content-specific beliefs (e.g., Myers et al., 2008; Myers & Wells, 2005). Further converging with those prior findings, metacognitive beliefs, but not content-specific beliefs, were the most consistently related to posttraumatic stress symptoms in the regression analyses. Negative cognitions about self and world, as well as beliefs about threat of harm, were the only content-specific beliefs that shared associations, albeit inconsistent, with posttraumatic stress symptoms in the regression analyses. Importantly, negative metacognitive beliefs accounted for unique variance in scores of each posttraumatic stress symptom cluster and it was the only variable to do so in the present study.

Metacognitive beliefs are lumped with content-specific beliefs in some cognitive-behavioral models of PTSD (e.g., Ehlers & Clark, 2000). The present results converge with the metacognitive model, which proposes that metacognitive beliefs are distinguishable from, and potentially more important than, content-specific beliefs when conceptualizing PTSD (Wells, 2009; Wells & Sembi, 2004a). The degree to which metacognitive beliefs are relevant to posttraumatic stress symptoms has potentially important treatment implications. Ehlers and Clark (2000) describe designing behavioral experiments to target metacognitive beliefs (e.g., testing whether thinking about trauma cues would make an individual go crazy). At the same time, Ehlers and Clark (2000) suggest targeting content-specific beliefs and memories. Metacognitive therapy differs from such cognitive-behavioral treatments in that the focus of metacognitive therapy is on metacognitive beliefs and not on content-specific beliefs or the content of trauma memory (Wells, 2009). Research supports the use of metacognitive therapy in reducing posttraumatic stress symptoms (Wells & Sembi, 2004b; Wells, Walton, Lovell, & Proctor, 2015).

Some researchers conceptualize metacognitive therapy as part of a group of contextual behavioral therapies (Hayes, Villatte, Levin, & Hildebrandt, 2011). Instead of focusing on changing the content of thoughts, contextual behavioral therapies seek to change one’s relations to thoughts in the service of reducing engagement in avoidant coping (Hayes et al., 2011). Given the importance of avoidant coping within the metacognitive model of PTSD (Wells, 2009; Wells & Sembi, 2004a), it is possible that other contextual behavioral therapies (e.g., mindfulness-based interventions) may be useful in reducing metacognitive beliefs as well. Nevertheless, it is important to note that metacognitive therapy involves aspects of mindfulness (e.g., detached mindfulness; Wells, 2009).

Study limitations must be acknowledged. Prior studies examining posttraumatic stress symptoms have also used Internet samples of community adults (e.g., Seligowski & Orcutt, 2016). Additionally, methods shown to increase the quality of remotely collected data were used in the present study (e.g., using only high reputation MTurk workers; Peer et al., 2014), and research supports MTurk as a viable method for data collection (Chandler & Shapiro,
of how several relevant covariates (e.g., Moser et al., 2007; Rustomo et al., 2007; Rous-

to posttraumatic stress symptoms. One advantage of the present study is that it conforms to diagnostic criteria for PTSD (American Psychiatric Association, 2013).

Limitations notwithstanding, the present results provide further evidence that metacognitive beliefs are important to our understanding of posttraumatic stress symptoms. Future research continuing to support the role of metacognition in relation to these symptoms may ultimately lead to the wider use of Wells’s (2009) metacognitive therapy in the service of reducing the burden of PTSD.

References


Received June 14, 2016
Revision received September 28, 2016
Accepted November 23, 2016