Confirmatory Factor Analysis and Incremental Validity of the Metacognitions Questionnaire-PTSD

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Introduction

Posttraumatic Stress Disorder (PTSD) following childhood trauma is a common occurrence, with meta-analyses estimating a prevalence rate of 15.9% – 36% (Alisic et al., 2014 and Fletcher, 2003, respectively). Although it is unclear how many children experience stressful life events (SLEs) that may lead to PTSD symptoms, research has suggested that 37% of adults have experienced the SLEs of sexual or physical maltreatment in childhood (Briere & Elliott, 2003). Considering the high number of individuals who may experience SLEs in childhood and the high prevalence rate of PTSD following childhood SLEs, there is no question that childhood SLEs may be especially detrimental to a child's developing mental health, with negative outcomes that last into adulthood. Understanding how childhood SLEs lead to lasting posttraumatic stress symptoms (PTSS) is necessary to improving these outcomes and understanding PTSD as a whole.

Generally, metacognition is an individual's knowledge and cognition about their and other's cognitive activity (Flavell, 1979). How an individual relates to their cognition may be an important factor in the development of mental and emotional problems. In the development of PTSD, metacognitions regarding PTSS-related thoughts and emotions may lead to the use of maladaptive coping strategies (e.g., thought suppression) to avoid those thoughts and emotions (Ehlers & Clark, 2000). This avoidance may ultimately lead to an increase in the intensity and frequency of those thoughts and emotions, thus exacerbating and maintaining PTSS (Ehlers & Clark, 2000).

Metacognitions may play a central role in the failure of PTSS symptoms to resolve following childhood SLEs. A well validated measure of metacognitions following SLEs is needed for the study of the these relationships. The Metacognitions Questionnaire-PTSD (MCQ; Wells, 2009) was developed to assess for metacognitions associated with exposure to SLEs. Exploratory factor analysis has suggested a two-factor structure: positive metacognitions (P-MCQ) and negative metacognitions (N-MCQ; Fergus & Bardeen, 2017). Furthermore, Fergus & Bardeen (2017) suggested that the MCQ accounted for the effects of other cognitive measures on PTSS. Since its development, no study has further examined the MCQ's factor structure nor explored its ability to explain the relationship between childhood SLEs and PTSS above and beyond other cognitive measures. The current study examined: (1) the adequacy of the two factor structure of the MCQ; (2) the incremental validity of the MCQ after controlling for other PTSD cognitions; and (3) the mediating role of the MCQ dimensions in the relationship between childhood trauma and PTSS.

Method

Participants (N = 120) were students at a large Midwestern U.S. university who scored above the cut-off on at least one of the five scales of the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998). The sample was 63.7% female and the average age was 19.5, with a range from 18 to 34 (SD = 2.0). The sample was 48.4% White, 27.4% African American, and 24.2% other, with 73.4% reporting as not Hispanic. The MCQ, CTQ, Posttraumatic Cognitions Inventory (PTCI; Foa et al., 1999), Posttraumatic Maladaptive Beliefs Scale (PMBS; Vogt et al., 2012), and PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013) were administered.

Results

Confirmatory Factor Analysis

- CFA using MLR estimation found a good to excellent fit for the two-factor structure of the MCQ ($\chi^2(53)$ = 67.854, p < 0.05; CFI = .936; TLI = .921; RMSEA = .048, 90% CI (0.000, 0.079); SRMR = .066).
- The two-factor model was a significantly better fit than a one-factor model (SBχ^2diff(1) = 26.845, p < 0.05), which provided a poor to marginal fit ($\chi^2(54)$ = 96.102, p < 0.01; CFI = .820; TLI = .779; RMSEA = .081, 90% CI [0.054, 0.106]; SRMR = .081).
- The correlation between the factors was r = .33.
- P-MCQ showed poor reliability, with a Cronbach alpha internal consistency coefficient of .56.
- N-MCQ showed acceptable reliability, with a Cronbach alpha internal consistency coefficient of .75.

Hierarchical Linear Regression

- The dependent variable in these analyses was PCL-5 score.
- On Step 1, the five CTQ scales were entered.
- On Step 2, the two MCQ scales were entered.
- On Step 3, the PTCI and PMBS scales were entered.
- CTQ-Emotional Abuse and CTQ-Sexual Abuse accounted for significant variance in PTSS on Step 1.
- On Step 2, only CTQ-Sexual Abuse and N-MCQ accounted for significant unique variance. The relationship between CTQ-Emotional Abuse and PTSS was fully accounted for by the MCQ scales. The relationship between CTQ-Sexual Abuse and PTSS was partially accounted for by the MCQ scales.
- On Step 3, the addition of the PTCI and PMBS scales did not account for any unique variance in PTSS, above and beyond the MCQ scales.

Table 1. Factor Loadings (Standardized Solution) from the Confirmatory Factor Analysis of the 12 MCQ Items

Item	Factor I	Factor II
I must go over events to make sense of them.	0.752	
It is important not to have gaps in my memory.	0.543	
Thinking about threats in the future will help me cope.	0.439	
Worrying will keep me safe.	0.292	
Paying attention to danger will keep me safe.	0.212	
I'll never be normal again.		0.753
My mind has been damaged by what happened.		0.740
I must be weak to respond like this.		0.737
I have lost control of my thoughts.		0.660
I could lose my mind if I continue to think this way.		0.567
I must stop thinking about what happened.		0.383
It's not normal to keep thinking about the trauma.		0.376

N = 120. Factor I = Positive Metacognitions. Factor II = Negative Metacognitions

Table 2. Means and Standard Deviations of, and Correlations Among, Study Measures.

Variables	M(SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Posttraumatic Stress Symptoms	24.4(17.7)														
Childhood Stressful Life Events															
2 Emotional Abuse	12.2(4.7)	.46**													
3 Physical Abuse	8.1(3.5)	.22*	.40**												
4 Sexual Abuse	6.1(3.4)	.35**	.08	.03											
5 Emotional Neglect	10.4(4.2)	.38**	.63**	.26**	-.09										
6 Physical Neglect	7.8(2.6)	.23*	.30**	.21*	-.07	.34**									
Metacognitions															
7 Positive	26.1(8.8)	.28**	.27**	.15	.20*	.06	.05								
8 Negative	24.1(15.4)	.66**	.50**	.22*	.29**	.34**	.16	.35**							
Posttraumatic Cognitions															
9 Threat of Harm	16.1(5.7)	.35**	.26**	.15	.17	.20*	.04	.21*	.45**						
10 Self-Worth and Judgment	14.9(6.4)	.36**	.29**	.01	-.03	.38**	.12	-.01	.53**	.23*					
11 Trustworthiness of Others	15.6(6.0)	.29**	.25**	.13	-.00	.41**	.18	-.02	.34**	.43**	.47**				
12 Cognitions About the Self	2.9(1.1)	.56**	.42**	.17	.20	.38**	.05	.29**	.77**	.48**	.72**	.46**			
13 Cognitions About the World	4.1(1.2)	.56**	.45**	.30**	.30**	.33**	.11	.23*	.63**	.65**	.34**	.45**	.68**		
14 Self-Blame	2.9(1.2)	.53**	.48**	.30**	.14	.40**	.18	.31**	.73**	.46**	.59**	.49**	.84**	.64**	

N = 120. *two-tailed p < .05, **two-tailed p < .01.

Table 3. Results of the Hierarchical Multiple Regression Analyses Predicting PTSS, Examining the Incremental Criterion Validity of the Scales of the MCQ.

Predictors	After Step 1 B	After Step 1 SE B	After Step 1 β	After Step 2 B	After Step 2 SE B	After Step 2 β	After Step 3 B	After Step 3 SE B	After Step 3 β
Dependent Variable = PCL-5									
Step 1 (R^2 change = .345**)									
CTQ – Emotional Abuse	0.992	0.406	.262*	0.200	0.383	.053	0.191	0.391	.051
CTQ – Physical Abuse	0.145	0.437	.028	0.089	0.381	.017	0.026	0.400	.005
CTQ – Sexual Abuse	1.809	0.415	.347**	1.114	0.381	.214**	0.951	0.399	.182*
CTQ – Emotional Neglect	0.854	0.441	.200	0.678	0.391	.159	0.536	0.415	.126
CTQ – Physical Neglect	0.693	0.569	.102	0.637	0.497	.094	0.878	0.517	.129
Step 2 (R^2 change = .165**)									
MCQ – Positive				0.070	0.150	.035	0.051	0.161	.025
MCQ – Negative				0.557	0.098	.483**	0.397	0.139	.345**
Step 3 (R^2 change = .026)									
PTCI – Cognitions About the Self							4.482	3.058	.268
PTCI – Cognitions About the World							1.893	1.858	.124
PTCI – Self-Blame							-1.589	2.106	-.105
PMBS – Threat of Harm							-0.092	0.291	-.030
PMBS – Self-Worth and Judgment							-0.182	0.330	-.065
PMBS – Trustworthiness of Others							0.020	0.266	.007

N = 120. *two-tailed p < .05, **two-tailed p < .01. MCQ = Metacognitions Questionnaire-PTSD. PCL-5 = PTSD Checklist for DSM-5. CTQ = Childhood Trauma Questionnaire. PTCI = Posttraumatic Cognitions Inventory. PMBS = Posttraumatic Maladaptive Beliefs Scale.

Mediation Analysis

- Mediation analyses were conducted using Hayes' PROCESS macro, model 4.
- The independent variable was PCL-5 score, the dependent variables were CTQ-Emotional Abuse (see Figure 1) and CTQ-Sexual Abuse (see Figure 2), and the mediator was N-MCQ.
- The association between CTQ-Emotional Abuse and PTSS was largely mediated by N-MCQ (b = 0.96, 95% CI [0.249, .1437]).
- The indirect effect from CTQ-Sexual Abuse to PTSS through N-MCQ was also significant (b = 0.82, 95% CI [0.206, 1.377]).
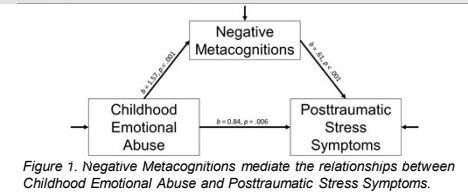

Figure 1. Negative Metacognitions mediate the relationships between Childhood Emotional Abuse and Posttraumatic Stress Symptoms.
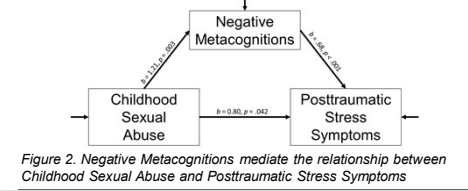

Figure 2. Negative Metacognitions mediate the relationship between Childhood Sexual Abuse and Posttraumatic Stress Symptoms

Discussion

- This study confirms the two-factor structure for the MCQ and replicates the incremental validity findings of the N-MCQ from Fergus & Bardeen (2016).
- The internal consistency of the P-MCQ was poor. Improvements to this scale are needed to understand how positive metacognitions may relate to childhood SLEs and later PTSS.
- Although the N-MCQ demonstrated adequate internal consistency, more work should be done to improve its reliability.
- Only CTQ-Emotional Abuse and CTQ-Sexual Abuse accounted for significant variance in PTSS at Step 1, suggesting that these childhood SLEs may be especially relevant to PTSS.
- When all variables were entered into the regression, only CTQ-Sexual Abuse and N-MCQ accounted for significant unique variance in PTSS. These findings support the role of negative metacognition in the relationship between childhood SLE and PTSS, above and beyond other posttraumatic cognition.
- Mediation analyses demonstrated that negative metacognition provided a plausible pathway from CTQ-Emotional Abuse to PTSS, and from CTQ-Sexual Abuse to PTSS.
- Future research may examine the psychometric properties of the MCQ in other populations. Whether metacognitions change following SLEs and how they may be altered during PTSS treatment should also be explored.