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<RRH>Clinical Utility of the CPTCI</RRH>

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<ATL>An Update on the Clinical Utility of the Children's Post-Traumatic Cognitions

Inventory</ATL><zaq;12>

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<ABS>The Children's Post-Traumatic Cognitions Inventory (CPTCI) is a self-report questionnaire that measures maladaptive cognitions in children and young people following exposure to trauma. In this study, the psychometric properties of the CPTCI were examined in further detail with the objective of furthering its utility as a clinical tool. Specifically, we investigated the CPTCI's discriminant validity, test-retest reliability, and the potential for the development of a short form of the measure. Three samples (London, East Anglia, Australia) of children and young people exposed to trauma ($N = 535$; 7–17 years old) completed the CPTCI and a structured clinical interview to measure posttraumatic stress disorder (PTSD) symptoms between 1 and 6 months following trauma. Test-retest reliability was investigated in a subsample of cases. The results showed a score in the range of 46 to 48 on the CPTCI, which was indicative of clinically significant appraisals as determined by the presence of PTSD. The measure also had moderate-to-high test-retest reliability ($r = .78$) over a 2-month period. The Children's Post-Traumatic Cognitions Inventory-Short Form (CPTCI-S) had excellent internal consistency ($\alpha = .92$), and moderate-to-high test-retest reliability ($r = .78$). The examination of construct validity showed the model had an excellent fitting factor structure (comparative fit index $= 0.95$, Tucker-Lewis index $= 0.91$, root mean square error of approximation $= .072$). A score ranging from 16 to 18 was the best cutoff point on the CPTCI-S, which was indicative of clinically significant appraisals as determined by the presence of PTSD. Based on these results, we concluded that the CPTCI is a useful tool to support the clinical practice of clinicians and that the CPTCI-S has excellent psychometric properties.**</ABS>**

<P>Over the past 20 years the body of research on the cognitive factors placing children and young people at risk of posttraumatic stress disorder (PTSD) has proliferated (Dalgleish, Meiser-Stedman, & Smith, 2005; Meiser-Stedman, 2002; Salmon & Bryant, 2002). Maladaptive cognitions developing in the aftermath of trauma, for example, viewing the self as incompetent or the world as dangerous, are thought to be principal risk factors for the development of posttraumatic stress disorder (PTSD; Ehlers, Mayou, & Bryant, 2003; Stallard & Smith, 2007). One clinical trial suggested these cognitions are important treatment targets during cognitive therapy for PTSD in children and young people (Smith et al., 2007).</P>

<P>The inclusion of a negative mood and cognitions cluster in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association [APA], 2013) was an important acknowledgement that maladaptive cognitions are central to the pathology of trauma responses. The Posttraumatic Cognitions Inventory (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) was the first comprehensive self-report questionnaire to measure trauma-related cognitions. One study examined the structure of items from the scale using principal components analysis, producing three factors: (a) negative cognitions about the self, (b) negative cognitions about the world, and (c) self-blame (Foa et al., 1999). The association of these three dimensions to levels of overall adjustment (i.e., the total frequency of PTSD symptoms) and to subclusters of PTSD has been previously tested in several studies (Beck et al., 2004; Moser, Hajcak, Simons, & Foa, 2007<zaq;1>). Importantly, one treatment trial also found that a reduction in PTS symptoms over the course of cognitive–behaviour therapy (CBT) was partially mediated by a reduction in the

severity of trauma-related cognitions throughout treatment (Beck et al., 2004; Mueser et al., 2008).

An adaptation of the PTCI for children and young people, known as the Children's Post-Traumatic Cognitions Inventory (CPTCI; Meiser-Stedman, Dalgleish, Glucksman, Yule, & Smith, 2009; Meiser-Stedman, Dalgleish, Smith, Yule, & Glucksman, 2007; Meiser-Stedman, Smith, et al., 2009) followed. An analysis of the measure's psychometrics showed it had moderate test-retest reliability ($r = .70$) and internal consistency ($\alpha = .75$; Meiser-Stedman, Smith, et al., 2009). Unlike the adult version of the measure, a validation study found the factor structure of the measure was best represented by two constructs: Disturbing and Permanent Change and Fragile Person in a Scary World (Meiser-Stedman, Smith, et al., 2009). The relationship of maladaptive cognitions to PTSD has now been demonstrated in samples of school children (Meiser-Stedman, Smith, et al., 2009), injured children with acute stress disorder (Ellis, Nixon, & Williamson, 2009; Nixon, Nehmy, et al., 2010; Salmon, Sinclair, & Bryant, 2007), injured children with PTSD (Meiser-Stedman, Smith, et al., 2009), and youth exposed to maltreatment (Leeson & Nixon, 2011).

In summary, maladaptive cognitions are thought to be a core aspect of PTSD in children and young people. The CPTCI is a promising questionnaire for measuring these processes, and as such, it would be helpful to examine the measure's psychometric properties in greater detail. This study had three aims. The first aim was to determine an appropriate cutoff for the CPTCI by establishing the measure's sensitivity to detect PTSD status. It is important to acknowledge that the terms specificity and sensitivity have strong connotations; we would like to make it clear that it was not our intention to produce an optimal cutoff measure to screen for PTSD, but to highlight young people in the clinical range on their

endorsement of problematic trauma-related cognitions as determined by the presence of PTSD. The second aim was to show the CPTCI's test-retest reliability in a sample that was not a part of the initial validation study (Meiser-Stedman, Smith, et al., 2009). The third aim was to create a short form of the CPTCI to facilitate the assessment of appraisals in clinical settings.

METHOD

Participants and Procedure

The initial sample was comprised of 535 children and young people ($M_{age} = 12.96$ years, $SD = 3.02$; 57.6% male); 43 participants, however, did not have diagnostic data on the presence of PTSD and were excluded from the study.

The final sample was comprised of 492 children and young people ($M_{age} = 12.98$ years, $SD = 2.99$; 56.9% male) recruited from East Anglia ($N = 242$; $M_{age} = 13.95$ years, $SD = 2.87$), London ($N = 133$; $M_{age} = 12.77$, $SD = 2.70$; Meiser-Stedman et al., 2007; Meiser-Stedman, Smith, Glucksman, Yule, & Dalgleish, 2008; Smith et al., 2007), and Australia ($N = 117$; $M_{age} = 11.79$, $SD = 2.87$; Nixon, Ellis, Nehmy, & Ball, 2010; Nixon, Sterk, & Pearce, 2012).

All study subjects were interviewed between 1 and 6 months of experiencing a trauma. Children recruited into the study had experienced single incident stressors, for example, motor vehicle collisions and physical assaults, as opposed to repeated trauma (e.g., domestic violence). The majority of children in the sample had experienced a road traffic

collision (RTCs; $N = 221$, 44.9%), followed by accidental injuries ($N = 175$, 35.6%), and then assaults ($N = 96$, 19.5%).

Each site received ethics approval from the relevant local institutional review board/research ethics committee. Written, informed consent was obtained from all individual participants.

At all sites the upper age limit was 17 years. In London and East Anglia, the lower age limit was 8 years, whereas in Adelaide it was 7 years. Recruitment rates (i.e., the proportion of families approached that completed the initial assessment) were 30.9–36.9% for the London prospective studies, and 29.5% and 33.4%, respectively, for the prospective studies carried out in Australia and East Anglia. Details of the recruitment flow for the London (Meiser-Stedman et al., 2007, 2008; Smith et al., 2007) and the Adelaide (Nixon, Ellis, et al., 2010; Nixon et al., 2012) sites have been described in detail elsewhere. In East Anglia, the exclusion criteria for cases recruited from emergency departments' trauma-exposed and clinical cases were as follows: intellectual disability, assaults where the assailant was the young person's caregiver or close relative, being unconscious for > 15 minutes following the traumatic event, not being fluent in English, ongoing exposure to threat, history of organic brain damage, and significant risk of self-harm.

Measures

In London, interviews were carried out in the family home or a clinic and families typically brought their completed CPTCI (as part of a questionnaire package sent prior to the appointment) on the day of their appointment. In Australia, phone interviews were carried out for trauma-exposed cases and trial-referred cases completed their measures in the university

clinic. In East Anglia, phone interviews were carried out for trauma-exposed cases; clinic-referred cases were either assessed at home, a local GP surgery, or at the clinic. PTSD was measured according to *DSM-IV* (APA, 1994) criteria using structured clinical interviews containing appropriate developmental adaptations for children and young people at all sites. The psychometric properties of these measures have been established in previous studies (Nader, 2002; Saigh et al., 2000; Silverman & Albano, 1996). The Clinician-Administered PTSD Scale for Children and Adolescents (CAPS-CA; Nader, 2002) and the Children's PTSD Inventory (Saigh et al., 2000) were administered to children in Australia and East Anglia, respectively. In London, for trauma-exposed cases, the PTSD module of the Anxiety Disorders Interview Schedule-Child Version (ADIS-C; Silverman & Albano, 1996) was administered. Clinic-referred cases completed the CAPS-CA (Nader, 2002).

Data Analysis

All analyses were carried out in SPSS Version 22 unless otherwise stated. The distributions of CPTCI and PTSD scores were skewed, but as results were replicated using transformed and raw scores, the results are reported using the raw data.

The CPTCI's sensitivity and specificity to detect PTSD status were examined. Sensitivity indexes the proportion of people who are correctly identified by the measure as having a particular condition. Specificity indexes the proportion of people who are correctly identified by the measure as not having the condition. The CPTCI's screening properties were then evaluated further using receiver operator characteristic (ROC) curves (Hanley & McNeil, 1982). A value of 1.00 indicates perfect classification for the relevant decision, whereas a test result of .5 indicates screening abilities no better than what would be achieved by chance.

<P>Items for the Children's Post-Traumatic Cognitions Inventory-Short Form

(CPTCI-S; see Table 1 {TBL 1}) were chosen after consideration of their factor loadings, and their correlations with the CPTCI total score and PTSD status. A confirmatory factor analysis (CFA) was carried out in EQS<zaq;6>. The CFA involved carrying out a multiple indicators multiple causes (MIMIC) model<zaq;7> to evaluate the impact of site on factor structure. Data from the clinic-referred Adelaide cases were not included in the examination of the CPTCI-S as only subscale and total scores were available for these cases. One model was tested following the scale items of the CPTCI (Meiser-Stedman, Smith, et al., 2009). The factor model was fitted using robust methods as this method is best for handling correlated data with high levels of skew (Lee, Poon, & Bentler, 1995). Multiple fit indices evaluated model fit, including the comparative fit index (CFI), Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA; Bentler, 2007).<P>

<H1>RESULTS</H1>

<P>There were 102 (20.7%) children and young people in the final sample who had a PTSD diagnosis. On the Fragile Person in a Scary World subscale, children with a PTSD diagnosis ($M = 32.67$, $SD = 7.98$) scored higher than children without PTSD ($M = 19.81$, $SD = 7.16$) as expected. Children with PTSD ($M = 31.73$, $SD = 9.47$) had higher scores on the Disturbing and Permanent Change scale than children without ($M = 16.68$, $SD = 5.74$). In the full sample, the point-biserial correlation of the CPTCI with PTSD diagnosis was significant ($r = .58$, $p < .001$). This indicated that although related to PTSD diagnoses, the short-form score was not simply a proxy for PTSD as the correlation was $< .80$.<P>

<P>Table 2 {TBL 2} presents the sensitivity and specificity coefficients of the CPTCI total score against PTSD diagnosis at varying cutoffs. Our data showed that a cutoff score

between 46 and 48 was the best indicator of clinically significant appraisals as determined by the presence of PTSD. With these cutoffs, sensitivity coefficients ranged between .82 and .84, and specificity coefficients ranged between .81 and .84. Additional ROC analyses suggested that at these cutoff points AUCs were good and ranged between .83 and .85.

The test-retest reliability of the CPTCI ($n = 203$) over a 2-month period was $r = .74$ for the Fragile Person in a Scary World subscale, and $r = .77$ for the Disturbing and Permanent Change subscale, and $r = .78$ overall. Paired t tests also showed that the Fragile Person in a Scary World subscale, $t(202) = -1.66$, $p = .100$, the Disturbing and Permanent Change subscale, $t(202) = -0.28$, $p = .780$, and the Overall scale, $t(202) = -1.18$, $p = .240$, did not significantly change over this 2-month period.

The CPTCI items to be included in the short form were selected based on their item total correlations, correlations to PTSD status, and factor loadings (from a preliminary factor analysis). The item-total correlations of the CPTCI (full version) ranged from $r = .59$, $p < .001$ to $r = .81$, $p < .001$, and correlations with PTSD status ranged from $r = .31$, $p < .001$ to $r = .62$, $p < .001$. A preliminary CFA (using the same analytic strategy as the CFA for the short form) on the full-form produced factor loadings that ranged between .53 and .81. The items included in the CPTCI-S performed strongly on all three criteria, and had item-total correlations at or above $r = .72$, $p < .001$, correlations with PTSD status at or above $r = .49$, $p < .001$, and factor loadings at or above .77.

A variety of fit indices were used to evaluate the fit of the model tested in the CFA analysis. On the CFI and TLI, a value of 0.90 shows a good fit, and a value of 0.95 shows an excellent fit (Kline, 2005). RMSEA values of ≤ 0.05 indicate a close fit,

0.05–0.08 a fair fit, and 0.08–0.10 a marginal fit by one standard deviation (Browne & Cudeck, 1992). In a sample of this size, factor loadings of $\geq .30$ are needed for that item to be considered to be of practical significance to the overall construct (Hair, Black, Babin, Anderson, & Tatham, 2006).

The CFA analysis of the 2-factor model produced a significant result, $\chi^2(34) = 82.59, p < .001$. This model was an excellent fitting model for the data according to the CFI (0.95) and TLI (0.91), and a good fit of the data according to the RMSEA $= .072$, confidence interval [.057, .086]. The factor loadings of the CPCTI-S are presented in Table 1. Factor loadings ranged from .64 to .79, easily meeting the minimum .30 value required for practical significance (Hair et al., 2006). The CPCTI-S had acceptable internal consistency for the Fragile Person in a Scary World subscale ($\alpha = .81$), for the Disturbing and Permanent Change subscale ($\alpha = .91$), and the full scale ($\alpha = .92$).

The test-retest reliability for Fragile Person in a Scary World ($r = .74, p < .001$) and Disturbing and Permanent Change ($r = .77, p < .001$) subscales was acceptable as was the total scale ($r = .78, p < .001$). Paired t tests also showed that the Fragile Person in a Scary World subscale, $t(202) = 0.32, p = .750$, the Disturbing and Permanent Change subscale, $t(202) = 0.03, p = .980$, and the Overall scale, $t(202) = 0.20, p = .840$, of the short form did not significantly change over this 2-month period. The point-biserial correlation of the CPCTI-S with PTSD diagnosis was statistically significant ($r = .59, p < .001$). The sensitivity and specificity of the CPCTI-S against DSM-IV PTSD diagnosis was also strong (Table 3{TBL 3}). The data indicated an appropriate cutoff score in the range of 16 to 18 was indicative of clinically significant appraisals

as determined by the presence of PTSD. With these cutoffs, sensitivity ranged between .85 and .91, and specificity ranged between .83 and .88.

DISCUSSION

This study further established the psychometric properties of the CPTCI by determining a cutoff for elevated/clinically significant scores on the measure. We also replicated previous studies by showing that the CPTCI has appropriate internal consistency and test-retest reliability. The CPTCI-S had excellent psychometric properties and slightly superior psychometrics to the CPTCI (Meiser-Stedman, Smith, et al., 2009).

Our findings replicated previous studies showing that maladaptive cognitions are strongly associated with PTSD (Leeson & Nixon, 2011; Meiser-Stedman, Dalgleish, et al., 2009; Meiser-Stedman, Smith, et al., 2009; Salmon et al., 2007), consistent with theoretical accounts of PTSD (Ehlers & Clark) and with the changes in the *DSM-5* to include a negative mood and cognitions cluster (APA, 2013).

It is important to highlight that the cutoffs found in this study are not intended to be used to screen for PTSD in youth; several measures fulfilling this function already exist (Kenardy, Spence, & Macleod, 2006; Perrin, Meiser-Stedman, & Smith, 2005). Rather, the cutoffs provide clinicians with an idea of what is a clinically significant level of negative appraisals. This may aid clinicians when assessing or formulating children's and adolescents' difficulties, and when monitoring children's progression through therapy. For researchers, the CPTCI-S offers a brief but psychometrically valid questionnaire for measuring negative trauma-related cognitions that may be involved in the maintenance of PTSD (e.g., in large-scale surveys) or may underpin recovery in treatment trials. One research question of particular interest is whether the CPTCI is a useful questionnaire to

differentiate changes during treatments focussed on modifying cognitive aspects versus exposure-based treatments for children (Nixon et al., 2012).

There are some study limitations worth noting. Although we feel the heterogeneity of our sample pooled from a number of different sites was a strength of the study, this introduced the possibility that site differences played a role, especially as a slightly lower optimal cutoff point was found when looking at the Adelaide site individually. There were also issues with generalisability. Measures of PTSD and CPTCI symptoms were taken between 1 and 6 months postdevelopment and in victims of one-off trauma only. The use of hospital-recruited samples to study responses to trauma is widely established in the child trauma field on the rationale that responses to trauma are hypothesised to occur on a continuum; however, it would be helpful to evaluate the psychometric properties of the CPTCI in a clinical population.

In the future, it will be important to replicate the cutoff examination in a more homogenous sample, and a range of other samples including children who have experienced other types of trauma such as a disaster, war, or abuse. It will also be important to investigate whether a similar clinical cutoff is found when comparing CPTCI scores to other psychological disorders (e.g., anxiety, depression). Future studies might investigate the convergent validity of the tool in further detail by exploring the measure's convergence with cognition words and cognitive characteristics in narratives.

To summarise, these findings add to the growing body of literature indicating cognitions are a core feature of PTSD status following traumatic experiences. Our results underscore the importance of routinely assessing for the presence of maladaptive cognitions in the aftermath of a trauma.

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<<enote>>AQ2: AU: Permanent and Disturbing was changed to Disturbing and Permanent in keeping with its use in the rest of the manuscript

<<enote>>AQ3: AU: There are two numbers here - please indicate the correct percentage

<<enote>>AQ4: AU: By "local GP surgery" do you mean a general practitioner's office? Please clarify.

<<enote>>AQ5: AU: Please include the Hanley & McNeil, 1982 reference in the Reference List

<<enote>>AQ6: A: Please spell out EQS and provide a reference

<<enote>>AQ7: AU: Please provide a reference for the MIMIC model

<<enote>>AQ8: AU: Please include the Kline, 2005 reference in the Reference List

<<enote>>AQ9: AU: Sentence edit OK?

<<enote>>AQ10: AU: Please provide the year of publication for Ehlers and Clark and include the reference in the Reference List.

<<enote>>AQ11: AU: Please cite this reference in the text or omit it from the Reference List

<<enote>>AQ12: AU/ED: The formal name of the Inventory using "Post-Traumatic" and not "Posttraumatic" has been used throughout.

<TN>Table 1

<TT>*Item Loadings for the Children's Post-Traumatic Cognitions Inventory–Short Form*

<TC>Item	Fragility in a Scary World	Disturbing and Permanent Change
<TB>5. I don't trust people.	.72	

7. I am no good.	.75
10. I can't cope when things get tough.	.66
15. Bad things always happen.	.82
4. Reactions since event mean I have changed for the worse.	.79
6. Reactions since event mean something is seriously wrong.	.81
14. I used to be a happy person but now I am always sad.	.75
16. I will never be able to have normal feelings again.	.82
19. My life has been destroyed by the frightening event.	.79
21. Reactions since the event mean I must be going crazy.	.77

<TFN>Note. $N = 492$.

<TN>Table 2

<TT>*Sensitivity and Specificity of Range of Cut Scores of CPTCI for DSM-IV PTSD Status*

<TC>Score	Sensitivity	Specificity
<TB> ≥ 50	.81	.86
≥ 49	.82	.85
≥ 48	.82	.84
≥ 47	.84	.83
≥ 46	.84	.81
≥ 45	.85	.80
≥ 44	.86	.80
≥ 43	.88	.76
≥ 42	.88	.74

<TFN>*Note.* $N = 492$. CPTCI = Children's Post-Traumatic Cognitions Inventory; *DSM-IV* = *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994); PTSD = posttraumatic stress disorder.

<TN>Table 3

<TT>*Sensitivity and Specificty of Range of Cut Scores of CPTCI-S for DSM-IV PTSD Status*

<TC>Score	Sensitivity	Specificity
<TB>≥ 25	.56	.97
≥ 24	.66	.97
≥ 23	.73	.95
≥ 22	.77	.94
≥ 21	.77	.94
≥ 20	.81	.92
≥ 19	.82	.90
≥ 18	.85	.88
≥ 17	.86	.86
≥ 16	.91	.83

<TFN>*Note.* $N = 492$. CPTCI-S = Children's Post-Traumatic Cognitions Inventory-Short Form; *DSM-IV* = *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994); PTSD = posttraumatic stress disorder.

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