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Running head: IRRATIONAL BELIEFS IN POSTTRAUMATIC STRESS
RESPONSES

**Irrational beliefs in posttraumatic stress responses: A Rational Emotive Behaviour
Therapy approach**

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Keywords: Rational Emotive Behaviour Therapy (REBT), irrational beliefs, dysfunctional cognitions, posttraumatic stress disorder (PTSD), structural equation modelling (SEM)

Abstract

The current study aimed to test a key theoretical prediction of Rational Emotive Behaviour Therapy theory by assessing the role of general and trauma-specific irrational beliefs in the prediction of posttraumatic stress responses. A sample (N = 313) of trauma-exposed emergency service workers participated in the study. Structural equation modelling results demonstrated that an REBT-based model provided satisfactory model fit and explained 89% of variance in posttraumatic stress symptomology. Theoretical predictions were supported with results demonstrating that general-level irrationality indirectly impacted posttraumatic stress responses via a set of trauma-specific irrational beliefs. Results indicate the importance of irrational beliefs in predicting posttraumatic stress responses.

Introduction

Substantial empirical evidence has been obtained to support both the efficacy and effectiveness of trauma-focused cognitive-behavioural therapy (TF-CBT) for posttraumatic stress disorder (PTSD; Bisson, Ehlers, Matthews, Pilling, Richards & Turner, 2007; Hofmann, Asnaani, Vonk, Sawyer & Fang, 2012). Therapeutic strategies for treating PTSD derive directly from theoretical cognitive models. In Ehlers and Clark's (2000) highly influential model of PTSD two cognitive processes are deemed critical in the development and maintenance of the disorder. First, there is an overly negative interpretation of the traumatic event and its sequelae, and second, there is a poor elaboration of the memory of the traumatic incident and insufficient integration of the trauma memory within one's autobiographical memory.

Clark and Beck (2010) have presented an updated cognitive model of PTSD in which traumatic experiences are hypothesised to interact with pre-existing schematic vulnerability factors. This gives rise to a range of maladaptive beliefs about the self, others, the world, the future, and the traumatic event itself. The presence of these belief systems has a negative impact on a number of cognitive processes leading to faulty trauma memories and attentional cognitive biases towards threatening stimuli. Such processes are hypothesised to produce the characteristic intrusive and hyperarousal symptoms which are consequently appraised in a negative manner leading to maladaptive behavioural control strategies which involve avoidance and emotion control/suppression efforts.

A range of psychometrically validated measures of specific cognitions relevant to PTSD derived from these theoretical models have been developed (e.g., Foa, Ehlers, Clark, Tolin & Orsillo, 1999; Vogt, Shipherd & Resick, 2012). In a recent study based upon the Ehlers and Clark (2000) model of PTSD, Kleim et al. (2013), utilizing sophisticated latent

growth modelling procedures, demonstrated for the first time that changes in dysfunctional cognitions (as measured by a shortened version of the Posttraumatic Cognition Inventory) significantly predicted subsequent reductions in PTSD symptomology. These findings strongly support the role of dysfunctional cognitions as key mechanisms of change in PTSD symptomology.

These cognitive models of PTSD are all based upon the general theoretical foundation of Beck's Cognitive Therapy model of psychopathology (e.g., Beck, 2011). An alternative CBT model of psychopathology which has received comparatively little empirical attention in the context of PTSD is Ellis' Rational Emotive Behaviour Therapy (REBT; Ellis, 2001). Although the theoretical models of Cognitive Therapy and REBT share much in common, important differences do exist, particularly with respect to the key etiopathogenetic cognitive variables in the development and maintenance of psychopathology (Hyland & Boduszek, 2012). Investigation of the role of the cognitive variables outlined in REBT theory offers the possibility of identifying additional critical dysfunctional cognitions associated with PTSD symptomology.

From the perspective of REBT theory the current cognitive models and psychometric measures of PTSD are incomplete. Contemporary REBT theory (David, Lynn & Ellis, 2010) describes four main irrational belief processes: (i) Demandingness beliefs are rigid imperatives directed toward the self, others, or the external environment for how things "must be", "have to be", "ought to be", or "absolutely should be": (ii) Catastrophizing beliefs are extreme negative evaluations of unpleasant life events: (iii) Low Frustration Tolerance beliefs involve appraisals of a negative event as unbearable and intolerable: and (iv) Depreciation beliefs reflect global negative evaluations of the self, others, and of life events. REBT theory proposes that Demandingness beliefs represent the core cognitive construct in the emergence

and maintenance of psychopathological responses and their impact on such outcomes will be mediated through the secondary irrational belief processes of Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs (David, Schnur & Belloiu, 2002; DiLorenzo, David & Montgomery, 2007). Recent empirical findings have provided further support for this hypothesised organisation of the irrational beliefs specifically in the context of PTSD. Through the application of structural equation modelling techniques Hyland, Shevlin, Adamson, and Boduszek (2013a) demonstrated that Demandingness beliefs indirectly impacted on each symptom group of PTSD via each of the secondary irrational belief processes.

The majority of evidence that exists in support of the predictions of REBT theory has been obtained through empirical investigation of the role of general-level irrational beliefs. REBT theory however predicts that disorder-specific variants of the irrational beliefs should mediate the impact of more generalised forms of irrational beliefs on emotional distress (Dryden, 2009), and that disorder-specific irrational beliefs should act as superior predictors of psychopathology as compared to the more generalised forms utilized in most research programs. Unfortunately very little research has been undertaken within the REBT domain to explore this central hypothesis.

DiLorenzo, David and Montgomery (2011) investigated the differential contributions of general-level and disorder-specific irrational beliefs in the emergence of exam related distress among 86 female students at two time periods (T1: start of term, and T2: immediately prior to the sitting of an exam at the end of term). They found that disorder-specific irrational beliefs were a better predictor of exam related distress than were general-level irrational beliefs when distress was measured immediately prior to the taking of an exam. When exam-related distress was measured at time 1 (start of term) neither general-level nor disorder-

specific irrational beliefs had an independent effect on distress. These results suggest that disorder-specific irrational beliefs make a contribution to the explanation of distress beyond the contribution of general-level irrational beliefs.

Moldovan (2009) examined the mediating role of specific illness related irrational beliefs in the relationship between general-level irrational beliefs and emotional distress. This study included a small sample of 56 cancer and type-II diabetes patients. Moldovan's results found that illness-specific irrational beliefs fully mediated the relationship between general-level irrational beliefs and depression, anxiety, and stress levels, respectively. Although these findings are consistent with the predictions of REBT theory, the low sample size and use of a cross-sectional research design in the establishment of mediation means that substantially more research is required in order to corroborate these findings.

REBT theory has been criticised (Padesky & Beck, 2003) as an overly monolithic therapy that is not well suited to adequately conceptualising the unique cognitive features of specific disorders such as PTSD due its focus on just a few core irrational belief processes. David, Szentagotai, Kallay and Macavei (2005) responded to this criticism by pointing out that while REBT theory fully incorporates the "cognitive content specificity hypothesis" of Cognitive Therapy theory (Riskind, 2004), the advantage of a reductionist approach favoured by REBT is an ability to explain the development of a range of psychological disorders in terms of the interactions between just a few irrational belief processes. David et al. (2005) point out that the REBT approach is similar to the approach to understanding psychopathology employed within the field of neuroscience where various forms of psychopathology are explained in terms of a small group of neurotransmitters, and the interactions that take place between them. David, Schnur and Belloiu (2002) have put forth a proposed model for the development of specific disorders based upon the interplay between

the primary (Demandingness) and secondary (Catastrophizing, Low Frustration Tolerance, and Depreciation) general-level irrational belief processes. Depression, for example, is hypothesised to involve Demandingness and self-Depreciation beliefs, while anxiety disorders are hypothesised to involve relationships between Demandingness beliefs and Catastrophizing and/or Low Frustration Tolerance beliefs. Research testing these individualised REBT models of psychopathology is still in its infancy and little empirical research exists to either confirm or reject the predictions of David and his colleagues (2002). Another plausible route towards the development of disorder-specific REBT models of psychopathology is the inclusion of disorder-specific variants of the irrational beliefs within a respective theoretical model.

The REBT research community has unquestionably failed to keep pace with the Cognitive Therapy community in terms of developing disorder-specific cognitive models of psychopathology. However, given the degree of empirical support for REBT theory and the importance of identifying additional dysfunctional cognitive processes associated with posttraumatic stress symptomology, investigation of the cognitive variables outlined in REBT theory appears highly warranted. Interestingly, in recent years a good deal of empirical work has indicated the importance of ‘distress intolerance’ beliefs in posttraumatic stress responses (Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein & Zvolensky, 2010; Vujanovic, Bonn-Miller, Potter, Marshall-Berenz & Zvolensky, 2011), a cognitive variable that shares a substantial degree of conceptual overlap with Low Frustration Tolerance beliefs.

The current study includes two primary objectives. The first is to test a central theoretical prediction of REBT theory regarding the indirect relationship between general-level irrational beliefs and posttraumatic stress responses via a set of trauma-specific irrational beliefs. The second objective is to provide evidence to the wider CBT community

regarding the important role of irrational beliefs, as described by REBT theory, in posttraumatic stress responses. The hypothesised indirect relationship between general-level irrational beliefs and posttraumatic stress symptoms via trauma-specific irrational beliefs will be investigated using structural equation modelling (SEM) techniques. Two alternative models will be tested; the first is a fully indirect model while the second assumes both a direct effect of general-level irrational beliefs on posttraumatic stress symptomology along with an indirect effect through trauma-specific irrational beliefs.

Methods

Participants and Procedures

The sample for the current study consisted of three hundred and thirteen ($N = 313$) trauma-exposed emergency service personnel (police, military, and related emergency service workers) recruited from active duty while serving in the Republic of Ireland and the Republic of Kosovo over a twelve month period (June 2011 – June 2012). All participants in the current study had experienced a ‘Criterion A’ trauma as outlined in the Diagnostic and Statistical Manual of Mental Disorders IV-Text Revised (DSM-IV-TR: American Psychiatric Association, 2000). The most commonly reported traumatic event was being involved in a serious accident (60.4%, $n = 189$), followed by a non-sexual assault by a stranger (56.9%, $n = 178$), and military combat (42.5%, $n = 133$). The sample included 212 males (67.7%) and 101 females (32.3%) and these individuals ranged in age from 23 to 65, with a mean age of 38.18 years ($SD = 8.70$). Participants were informed of the nature of the study either by a member of the research team or an assigned liaison for a particular organisation, and each participant’s involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample.

Materials

The Posttraumatic Stress Diagnostic Scale (PDS: Foa, Cashman, Jaycox & Perry, 1997) is a 49-item self-report measure of the severity of posttraumatic stress symptomology related to a particular traumatic event. The PDS assess all aspects of a PTSD diagnosis from Criteria A to F as outlined in the DSM-IV-TR (American Psychiatric Association, 2000). The PDS measures the nature of the traumatic experience, the duration of the experienced symptoms, the impact of the experienced symptoms on daily functioning, and the severity of the symptoms. Seventeen items measure each of the identified symptoms of PTSD along a four-point Likert scale. Respondents rate the severity of each symptom from a score of 0 ("not at all or only one time") to 3 ("5 or more times a week / almost always"). This produces a total range of scores from 0 to 51 with higher scores indicating higher levels of posttraumatic stress symptomology. The PDS possess strong psychometric properties with Griffin, Uhlmansiek, Resick, and Mechanic (2004) demonstrating that it shares a strong correlation ($r = .71$) with the Clinician-Administered PTSD scale (Blake et al., 1995).

The Abbreviated Version of the Attitudes and Belief Scale 2 (AV-ABS2: Hyland, Shevlin, Adamson & Boduszek, 2013b) is a 24-item self-report measure of general rational and irrational beliefs, as defined by current REBT theory (David et al., 2010). The AV-ABS2 measures all four Irrational Belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation) and all four Rational Belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance). Each subscale is measured via three items. **The construct validity of the AV-ABS2 has been demonstrated in a previous confirmatory factor analytic study (Hyland et al., 2013b), and its psychometric properties were demonstrated to be superior to the full length Attitudes and Beliefs Scale-2 (DiGiuseppe, Leaf, Exner, & Robin, 1988).** Items of the AV-ABS2 include, "I must do well at important things, and I will not accept it if I do not do well" (Demandingness): "It's awful

to be disliked by people who are important to me, and it is a catastrophe if they don't like me” (Catastrophizing): “Its unbearable being uncomfortable, tense or nervous and I can't stand it when I am” (Low Frustration Tolerance): and “If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person” (Depreciation). Items are scored along a five-point Likert scale from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”), with higher scores in each case indicating higher levels of the respective variable. Possible scores of each subscale range from 3-15. The AV-ABS2 exhibited satisfactory internal consistency with all subscales recording a Cronbach’s Alpha level above .80.

In order to measure trauma-specific variants of each of the four irrational belief processes a new scale called the Trauma-Related Irrational Belief Scale (TRIBS) was constructed for the current study (see Appendix A for the full scale). The TRIBS is an 8-item self-report measure of irrational beliefs specifically related to the experience of a traumatic life event. The scale was constructed in accordance with guidelines set forth by Montgomery, et al. (2007) in the development of their ‘Exam-Related Belief Scale’ which was used to capture rational and irrational beliefs specifically related to the context of exam-related distress. The TRIBS includes sub-scales for each of the four irrational belief processes and each belief process is measured via two items. Items of the TRIBS are scored along a five-point Likert scale from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”). Items 4 and 6 included in the scale were scored in a reverse direction. Scores on each subscale range from 2-10 with higher scores reflecting higher levels of irrationality. Internal consistency for the full scale was satisfactory ($\alpha = .95$), and each of the subscales also yielded acceptable results with all alpha levels exceeding .80.

Analysis

Descriptive statistics and preliminary analysis were conducted within Statistical Package for the Social Sciences (SPSS) 20. The theoretical models illustrated in figures 1 and 2, respectively, were analysed using structural equation modelling (SEM) techniques. SEM is a combination of two analytical procedures; confirmatory factor analysis (CFA) which assesses the measurement component of a theoretical model, and path analysis which assesses the relationship between latent variables. Within an SEM framework, the structural and measurement elements of analysis are estimated simultaneously (McCallum & Austin, 2000). A number of other features make the use of SEM procedures appropriate for the current analysis. These include controlling for systematic and random measurement error and the ability to simultaneously test for both direct and indirect effects within a model (Bollen, 1989). The SEM analysis was conducted in Mplus version 6.0 (Muthen & Muthen, 1998 – 2010) with Robust Maximum Likelihood (MLR) estimation.

The overall fit of each model and the relative fit between models were assessed using a range of goodness-of-fit statistics and assessment of the appropriateness of the model parameters. The chi-square (χ^2) statistic assessed the sample and implied covariance matrix and a good fitting model is indicated by a non-significant result. However the chi-square statistic is strongly associated with sample size, and as such good models tend to be over-rejected. Therefore Tanaka (1987) suggested that a model should not be rejected simply on the basis of a significant chi-square result. Accordingly, it is recommended that researchers examine the ratio of the chi-square value to the degrees of freedom (df), and according to Klein (1994), any model with a χ^2 -to-df ratio of less than 3:1 indicates a good fitting model. The Comparative Fit Index (CFI; Bentler, 1990) and the Tucker Lewis Index (TLI; Tucker & Lewis, 1973) are measures of how much better the model fits the data compared to a baseline model where all variables are uncorrelated. For these indices values above .90 indicate

reasonable fit while values above .95 indicate good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, two more absolute indices are presented; the standardized root mean-square residual (SRMR: Joreskog & Sorbom, 1981) and the root mean-square error of approximation (RMSEA: Steiger, 1990). Ideally these indices should be less than .05 however values less than .08 also suggest adequate fit (Bentler, 1990; Hu & Bentler, 1999; Joreskog & Sorbom, 1993). Furthermore, Akaike Information Criterion (AIC; Akaike, 1974) was used to evaluate the alternative models, with the smaller value indicating the best fitting model. The CFI, RMSEA and the AIC all have explicit penalties for model complexity.

Results

Descriptive Statistics and Factor Correlations

The mean level of posttraumatic stress symptomology (PTS) for the entire sample was 11.40 (SD = 10.77; scores ranged from 0-41). The mean scores for general irrationality was 28.32 (SD = 14.16; scores ranged from 12-60) and the mean scores for trauma-specific irrationality was 18.39 (SD = 10.44; score ranged from 8-40). All correlations between the latent variables were positive and statistically significant. General irrationality ($r = .86, p < .001$) and trauma-specific irrationality ($r = .94, p < .001$), were both strongly associated with levels of PTS. General irrationality and trauma-specific irrationality were also highly correlated ($r = .91, p < .001$).

Measurement Models

Based on extensive findings regarding the factor structure of posttraumatic stress indicators (e.g., Yufik & Simms, 2010), three alternative models of the PDS (Foa et al., 1997) were investigated. Model 1 is a four-factor solution (Intrusions, Avoidance, Emotional Numbing, and Hyperarousal) first suggested by King, Leskin, King and Weathers (1998); Model 2 is an

alternative four-factor solution (Intrusions, Avoidance, Dysphoria, Hyperarousal) first suggested by Simms, Watson and Doebbeling (2002); and Model 3 is the DSM-IV-TR's three-factorial solution. The Simms et al. 'Dysphoria' model was found to be the best fitting model yielding the most impressive fit statistics ($\chi^2 = 152.94$, $df = 113$, $p < .001$; CFI = .98; TLI = .98, RMSEA = .03; SRMR = .03) along with the lowest AIC value. These four subscales were consequently used as measured variables within the full structural model in order to construct a posttraumatic stress (PTS) latent variable.

Structural Model

The REBT fully indirect model of PTS (Figure 1) was thus developed and included three latent variables: (i) General Irrationality measured via the four general-level irrational belief subscales of the AV-ABS-2; (ii) Trauma-Specific Irrationality measured via the four trauma-specific irrational belief subscales of the TRIBS; and (iii) PTS measured via Intrusions, Avoidance, Dysphoria, and Hyperarousal. Factor loadings for each measured variable on their respective latent variable were all statistically significant, positive, and greater than 0.60 (see Table 1 for full details).

[Insert Table 1 here]

The fully indirect REBT model of PTS produced satisfactory model fit statistics ($\chi^2 = 84.80$, $df = 52$, $p = .003$; RMSEA = .05 (CI 90% = .03/.06); SRMR = .02; CFI = .99; TLI = .98; AIC = 20145.69) and explained 89% of the variance in posttraumatic stress symptoms. As can be seen in Figure 1, General Irrationality had a statistically significant, positive, and strong direct impact on Trauma-Specific Irrationality ($\beta = .91$, $p < .001$), while Trauma-Specific Irrationality also displayed a statistically significant, positive, and strong direct effect on PTS ($\beta = .94$, $p < .001$). Additionally, a statistically significant, positive, and strong indirect effect

was observed between General Irrationality and PTS via Trauma-Specific Irrationality ($\beta = .86, p < .001$).

[Insert Figure 1 here]

The direct and indirect model REBT model PTS produced similar fit statistics to the fully indirect model ($\chi^2 = 84.926, df = 51, p = .003$; RMSEA = .05 (CI 90% = .03-.06); SRMR = .02; CFI = .98; TLI = .98; AIC = 20149.20) accounted for 88% of the variance in levels of PTS. As can be seen in Figure 2, General Irrationality had a statistically significant, positive, direct, and strong impact on Trauma-Specific Irrationality ($\beta = .91, p < .001$), while Trauma-Specific Irrationality again was found to have a statistically significant, positive, strong, direct impact on PTS ($\beta = .86, p < .001$). Importantly however, no statistically significant direct effect was observed between General Irrationality and PTS. The indirect effect remained statistically significant between General Irrationality and PTS via Trauma-Specific Irrationality, however this relationship was slightly lower than within the fully indirect model ($\beta = .81, p < .001$).

[Insert figure 2 here]

Discussion

The current study was performed in order to substantially develop PTSD-based research within the REBT community specifically, and to contribute evidence to the wider scientific community regarding the role of irrational beliefs as **potentially** important dysfunctional cognitions in posttraumatic stress responses. REBT theory is explicit in predicting that context-specific variants of each irrational belief process should not only directly influence various psychopathological outcomes (Ellis, 2001), but that they should also serve as a

mediator between more generalised forms of irrational beliefs and psychopathological responses (Dryden, 2009).

In order to empirically test this hypothesis, two theoretically derived REBT models of posttraumatic stress symptomology were developed. The first model was in-line with REBT theory (Dryden, 2009) and predicted that general-level irrationality would impact upon posttraumatic stress symptoms indirectly via a set of trauma-specific irrationality. The second model reflected a slightly modified version of REBT theory and assumed a direct relationship between general irrationality and posttraumatic stress symptomology, along with the expected indirect relationship via trauma-specific irrationality.

The results of the SEM analysis indicated that both the models of posttraumatic stress responses were a good fit of the data. It was difficult to identify a superior model based upon the incremental and absolute model fit statistics. The fully indirect model was found to be superior only on the basis of the TLI results. AIC values which are used to compare alternative models also suggested both that models were practically indistinguishable however the fully indirect model did record a marginally lower value suggesting it to be statistically superior. **On the basis of these results in addition to the fact that the fully indirect model possesses fewer model parameters and is consistent with the general REBT model of psychopathology, the fully indirect model was preferred on the grounds of parsimony and theoretical consistency.**

Dryden (2009) has theorised that the activation of general-level irrational beliefs during an activating event biases information processing leading to the development of dysfunctional automatic thoughts, which are then evaluated by means of context-specific irrational beliefs. These context-specific irrational beliefs are expected to derive from more general-level irrational beliefs that are already a component of one's cognitive architecture.

In others words, general-level irrational beliefs are viewed as critical factors in the development and maintenance of psychopathological responses however these beliefs are hypothesised to indirectly impact psychopathological responses by leading to the creation of context-specific irrational beliefs. This general REBT theoretical formulation shares much in common with Clark and Beck's (2010) updated cognitive model of PTSD.

Results of the current study are in line with Dryden's (2009) predictions as general-level irrationality was found to exert a strong direct effect on trauma-specific irrationality, but no direct effect was observed between general-level irrationality and posttraumatic stress symptomology. The direct effect between trauma-specific irrationality and posttraumatic stress symptomology was found to be very strong, supporting Ellis' (2001) argument that context-specific versions of the various irrational belief processes offer a potent predictor of psychologically distressing outcomes.

The current findings suggest that the presence of general-level irrational beliefs (Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, and Depreciation beliefs) within an individual's cognitive architecture represent important cognitive vulnerability factors for the development of posttraumatic stress reactions, while the more context-specific variants of these cognitive processes (associated with the individual's traumatic experience) appear to be a more proximate predictor of such psychopathological responses.

The fully indirect REBT model was found to explain 89% of variance in posttraumatic stress symptoms, thus providing strong evidence that the irrational beliefs, as outlined in REBT theory, play a crucially important role in posttraumatic stress responses. REBT theory states that Demandingness beliefs represent the core psychological construct in the emergence of psychological distress, and that their impact on psychopathological

responses is mediated through the secondary irrational belief processes of Catastrophizing, Low Frustration Tolerance, and/or Depreciation beliefs. This contention has drawn criticism from many within the Cognitive Therapy community (e.g., Padesky & Beck, 2003) however recently empirical work has provided support for this core REBT hypothesis (David et al., 2002; David et al., 2005; Hyland et al., 2013; Soloman et al., 2003; and Szentagotai et al., 2008). **Results from the current analysis add additional support to previous findings demonstrating the accuracy of the theoretical predictions of REBT in general, and also add original evidence to the scientific literature regarding the importance of irrational beliefs in explaining posttraumatic stress responses, specifically.**

Current findings lend considerable empirical support for our suggestion that REBT theory can convincingly overcome the reasonable criticisms of Padesky and Beck (2003) that REBT is an overly monolithic approach that is incapable of formulating individualized and disorder-specific models of psychopathology. **While REBT theory has generally always favoured a more transdiagnostic approach to conceptualising psychopathology,** the current study suggests that it is possible for the REBT community to substantially develop its theoretical base through the development of more disorder-specific models of psychopathology by placing an emphasis on conceptualizing, measuring, and evaluating the role of disorder-specific irrational beliefs in the development and maintenance of various forms of psychopathology. In doing so, not only can the field of REBT flourish but the wider scientific community can be enriched by such theoretical advancements and discoveries.

Although there is considerable evidence attesting to the importance of each irrational belief process described by REBT theory in a range of psychopathologies (Browne, Dowd & Freeman, 2010; Dryden & David, 2008), these cognitive constructs have generally not yet been integrated within mainstream cognitive-behavioural models of PTSD. Current and past

results (Hyland et al., 2013a) suggest that these irrational belief processes have an important role to play in the development and maintenance of posttraumatic stress reactions, and that their rational belief counterparts are critical factors in protecting against the development of posttraumatic stress responses (Hyland, Shevlin, Adamson, & Boduszek, 2013c), therefore greater consideration of both general-level and trauma-specific irrational beliefs could potentially yield greater theoretical understandings of the cognitive architecture upon which posttraumatic stress responses rest, and lead to more efficacious treatment interventions. Substantially more evidence is certainly required before any firm conclusions can be drawn regarding the importance of the irrational beliefs in predicting the development of PTSD. These studies are limited considerably due to the cross-sectional nature of the study designs and future work should ideally seek to replicate the design of Kleim and colleagues (2013) in evaluating the role of irrational belief in PTSD symptomology.

As with any research endeavour, the current study contains a number of limitations which need to be considered. The most salient limitation of the current study relates to the attempt to test predictions of mediation with the use of cross-sectional data. Given that the current study was cross-sectional in nature it was impossible to ascertain whether trauma-specific irrationality mediated the relationship between general-level irrationality and posttraumatic stress symptomology due to the temporal assumptions inherent in determining causality which mediation implies. Although results of the current study are in-line with the predictions of REBT theory the possibility remains that the development of trauma-specific irrationality in the immediate aftermath of a trauma could generalise and lead to the emergence of more general-level irrationality. Although this is contrary to theoretical prediction such an occurrence is plausible and cannot be ruled out within cross-sectional designs therefore future research efforts should ideally seek to utilize longitudinal data in

order to test this possibility. Furthermore, a self-report measure of posttraumatic stress symptoms was employed and although self-report measures of PTSD, such as the PDS (Foa et al., 1997) used in the current study, have been shown to highly correspond with clinician-administered measures (Griffin et al., 2004), clinician-based measures would have been preferable as they are considered the gold standard method of assessing PTSD symptomology.

In conclusion, this study originally contributes to both the trauma and REBT literature in a number of important ways. The current study is the first of its kind to apply latent variable modelling techniques to determine the direct and indirect effects of trauma-specific irrational beliefs among a sample of participants experiencing posttraumatic stress symptoms. Given the strength of the direct effects observed between trauma-specific irrationality and posttraumatic stress symptomology, as well as the level of variance explained in such symptoms due to both general and trauma-specific irrational beliefs, this study has highlighted the importance of a set of cognitive variables that are currently ignored within current cognitive-behavioural models of PTSD.

Appendix

The Trauma Related Irrational Belief Scale

As you answer the following questions please think about the traumatic event you described in the previous section of this questionnaire.

For each statement below please indicate whether you Strongly Disagree (A), Somewhat Disagree (B), are Neutral (C), Somewhat Agree (D), or Strongly Agree (E).

- | | A | B | C | D | E |
|----|------------------------------|------------------------------|----------------|---------------------------|---------------------------|
| | STRONGLY
DISAGREE | SOMEWHAT
DISAGREE | NEUTRAL | SOMEWHAT
AGREE | STRONGLY
AGREE |
| 1. | | | | | A B C D E |
| 1. | | | | | A B C D E |
| 2. | | | | | A B C D E |
| 3. | | | | | A B C D E |
| 4. | | | | | A B C D E |
| 5. | | | | | A B C D E |
| 6. | | | | | A B C D E |
| 7. | | | | | A B C D E |
| 8. | | | | | A B C D E |

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Table 1

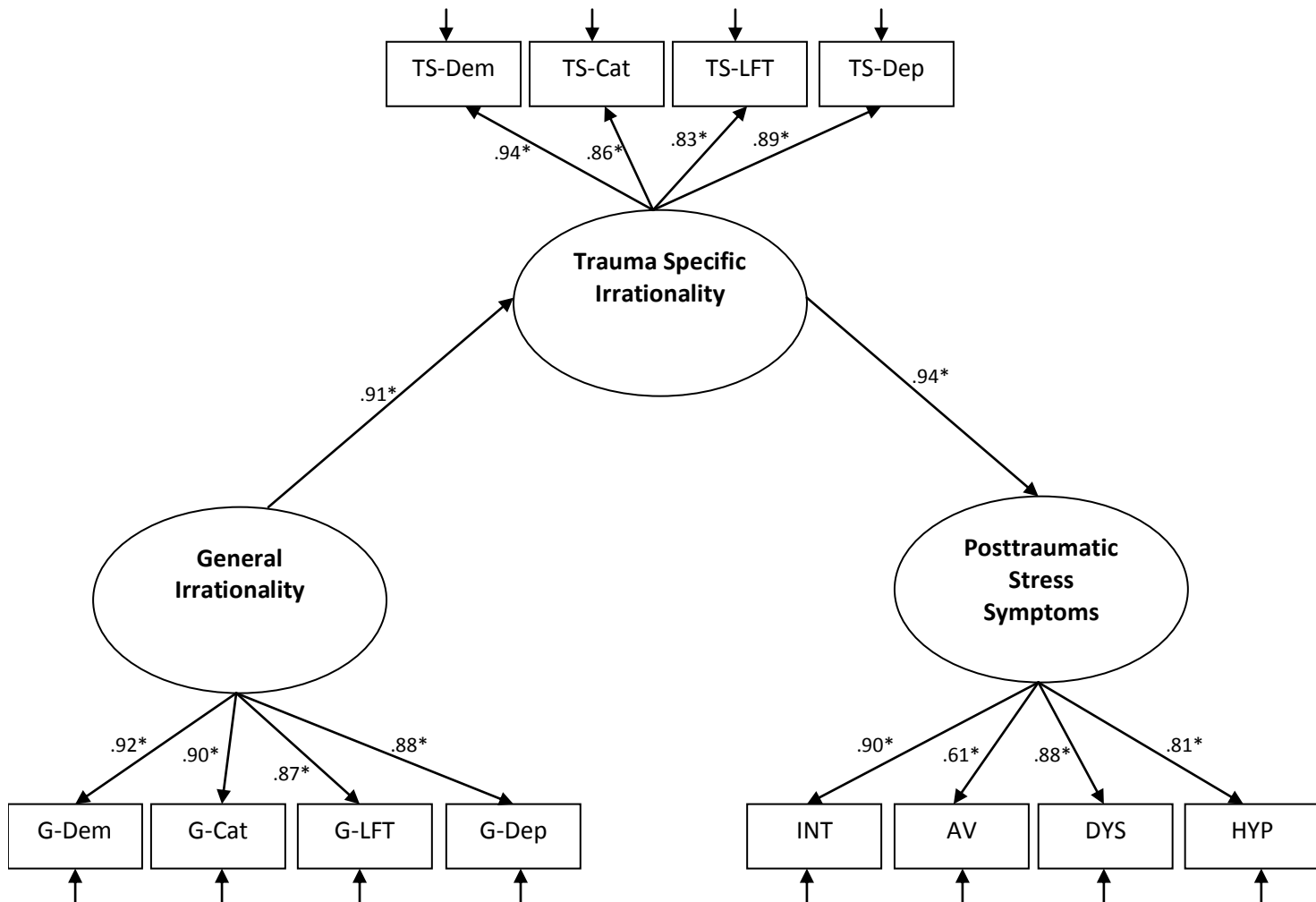
Standardized and Unstandardized Factor Loadings (and Standard Errors) for each latent variable

Item	β	B	SE
PTS			
Intrusions	.90	1.00	---
Avoidance	.61	.39	.03
Dysphoria	.88	1.61	.08
Hyperarousal	.81	.48	.03
Trauma-Specific Irrationality			
Demandingness	.94	1.00	---
Catastrophizing	.86	.98	.03
Low Frustration Tolerance	.83	.80	.04
Depreciation	.90	.96	.03
General Irrationality			
Demandingness	.92	1.00	---
Catastrophizing	.90	.99	.03
Low Frustration Tolerance	.87	.95	.03
Depreciation	.88	1.07	.04

Note. All Factor loadings are statistically significant ($p < .001$).

Figure 1

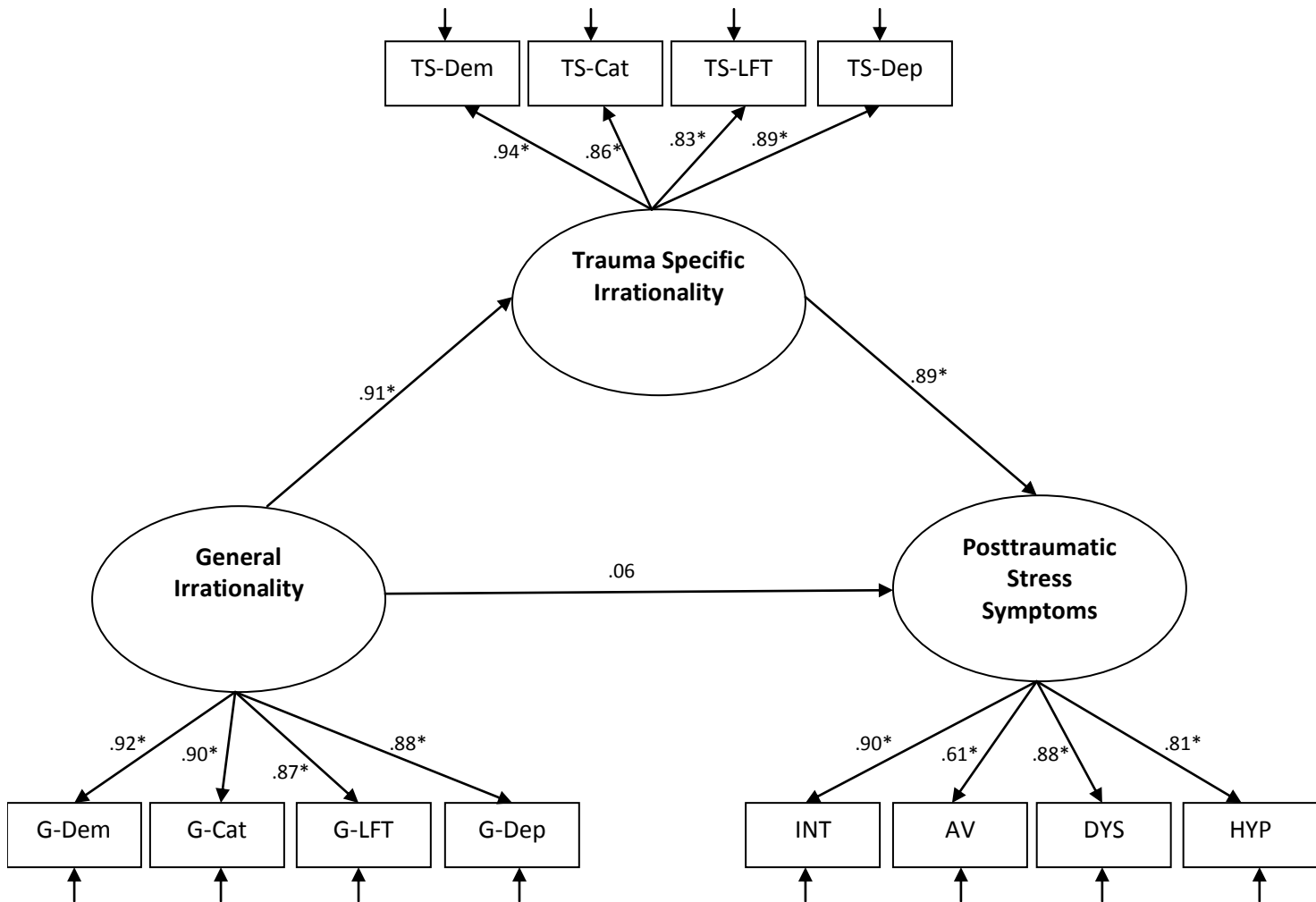
REBT Fully Indirect model of Posttraumatic Stress Symptoms



Note: G-DEM = General Demandingness, G-CAT = General Catastrophizing, G-LFT = General Low Frustration Tolerance, G-DEP = General Depreciation, TS-DEM = Trauma-Specific Demandingness, TS-CAT = Trauma-Specific Catastrophizing, TS-LFT = Trauma-Specific Low Frustration Tolerance, TS-DEP = Trauma-Specific Depreciation, INT = Intrusions, AV = Avoidance, DYS = Dysphoria, HYP = Hyperarousal. Statistical significance: * $p < .001$

Figure 2

REBT Direct and Indirect model of Posttraumatic Stress Symptoms



Note: G-DEM = General Demandingness, G-CAT = General Catastrophizing, G-LFT = General Low Frustration Tolerance, G-DEP = General Depreciation, TS-DEM = Trauma-Specific Demandingness, TS-CAT = Trauma-Specific Catastrophizing, TS-LFT = Trauma-Specific Low Frustration Tolerance, TS-DEP = Trauma-Specific Depreciation, INT = Intrusions, AV = Avoidance, DYS = Dysphoria, HYP = Hyperarousal. Statistical significance: * $p < .001$