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EVENT CENTRALITY AFTER TRAUMA: STABILITY, TRAUMA TYPE, AND POSTTRAUMATIC STRESS DISORDER

by

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Advisor   Date

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CHAPTER 1

General Introduction

Over the course of a lifetime, nearly all adults will encounter at least one life-threatening or dangerous traumatic experience often with accompanying feelings of fear, horror, and hopelessness (Ozer, Best, Lipsey, & Weiss, 2003). Yet, only 6.8% of U.S. adults will develop posttraumatic stress disorder (PTSD) over the course of a lifetime (National Comorbidity Survey, 2005). Despite decades of research, it remains unclear why some individuals suffer from post trauma mental health disorders and others do not. Studies indicate personality traits, such as neuroticism, may increase the risk of PTSD (Breslau, Davis, Andreski, & Peterson, 1991) and that the type of traumatic event preceding PTSD symptoms, such as rape, may also increase the risk of developing PTSD (Kessler et al., 2014). However, clinicians and researchers have little predictive ability to anticipate who will develop PTSD after a traumatic event. The following three studies highlight one aspect of the trauma and PTSD relationship, namely how central a traumatic event becomes in one's life. Specifically, the following studies ask whether understanding traumatic event centrality can assist in understanding PTSD symptoms and whether event centrality may, indeed, be a PTSD symptom on its own. The following studies also examine these questions from an applied perspective in an attempt to better understand how some groups that are highly traumatized, such as refugees, vary widely in their PTSD symptomology and whether the use of less overt mental health measures, such as event centrality, may be a useful measure of psychological distress in populations where poor mental health is highly stigmatized and infrequently disclosed.

What is PTSD?

Posttraumatic stress disorder was originally conceptualized as a mental health disease occurring in veterans following war exposure, specifically following war exposure in Vietnam. PTSD was first described in the 3rd edition of the *Diagnostic and Statistical Manual (DSM)* and included two mandatory criteria, A1 and A2, as well as behavioral, emotional, and physical symptoms (3rd ed., *DSM-III*, American Psychiatric Association, 1980).

A1 and A2 criteria.

The *DSM* PTSD A1 criterion requires the individual to have experienced a "psychologically distressing event that is outside the range of usual human experience" such as a serious physical threat to the self or close loved ones, or witnessing threats or harm to another person (p. 247, 3rd ed., *DSM-III*, American Psychiatric Association, 1980). The A2 criterion requires the individual to report feelings of intense fear, horror, and hopelessness during or immediately following the traumatic event (3rd ed., *DSM-III*, American Psychiatric Association, 1980). Using the *DSM-III* and *DSM-IV* guidelines, both A1 and A2 criteria must be met for a PTSD diagnosis to be warranted. The emphasis on the A1 criterion was unique among *DSM* disorders in that it required a specific, identifiable preceding traumatic event causing the PTSD symptoms. This distinct etiological requirement allowed PTSD to be delineated from other disorders such as depression and anxiety, which share many overlapping symptoms with PTSD (Rosen, & Lilenfeld, 2008). In theory, the A1 criterion requirement was sound. One could not be diagnosed with PTSD without some preceding traumatic event; thus, individuals with no traumatic event could not develop *post*traumatic stress disorder. Additionally, inclusion of the A2 criterion was not surprising. Individuals who experienced a traumatic event would most likely report feelings of psychological distress during or immediately following the event. The A1 and A2 criteria remained necessary for a PTSD diagnosis until 2013 when the *DSM-5*

dropped the A2 criterion because research indicated feelings of fear and horror immediately after a traumatic event did not delineate those who reported other PTSD symptoms from those who did not (Friedman, Resick, Bryant, &, Brewin, 2011). As will be discussed later, other researchers have argued it is not the A1 criterion that matters most for PTSD symptoms but the individual's response to the traumatic event (i.e., the A2 criterion) which is most strongly related to PTSD symptoms (Boals & Schuettler, 2011).

PTSD symptom clusters.

In addition, a PTSD diagnosis required symptoms from three symptom clusters: re-experiencing the event (e.g., flashbacks, intrusive thoughts and emotions), avoidance/numbing (e.g., avoiding people and places which served as reminders of the trauma, emotional numbing through decreased happiness and hope for the future), and hyper-arousal (e.g., disrupted sleep, hyper vigilance). A diagnosis was warranted only if these symptoms have been occurring for at least one month (3rd ed., *DSM-III*, American Psychiatric Association, 1980).

The specific number of required symptoms within each symptom cluster has changed from the *DSM-III* to the *DSM-5*. Specifically, the *DSM-III* required one re-experiencing symptom (out of four possible symptoms), three numbing/avoidance symptoms (out of seven possible symptoms), and two hyper-arousal symptoms (out of six possible symptoms) (3rd ed., *DSM-III*, American Psychiatric Association, 1980). Alterations were made for the *DSM-IV* to move a symptom that had previously been identified as a hyper-arousal symptom, i.e., physiological activity upon exposure to events that symbolize or resemble an aspect of the traumatic event, and moved this symptom into the re-experiencing symptom cluster (4th ed., *DSM-IV-TR*, American Psychiatric Association, 2000). The re-experiencing and hyper-arousal symptom clusters remained relatively unchanged in the *DSM-5*, however, the

avoidance/numbing cluster has now been split into two clusters, including one symptom of avoidance (out of two possible symptoms), and two symptoms of negative alterations in cognitions or moods (out of seven possible symptoms) (5th ed., *DSM-5*, American Psychiatric Association, 2013). Generally, however, these changes involved re-labeling or shifting existing PTSD symptom criteria; PTSD symptom requirements have remained largely unchanged since its inception as a mental health disorder.

Causes and special memory mechanisms for PTSD?

Since its conceptualization as a mental health disorder, PTSD has either implicitly or explicitly included special cognitive mechanisms to account for PTSD symptomology. Researchers have argued that memories for exceptionally stressful or traumatic events are somehow different from other types of memories and special memory mechanisms must account for the characteristics of these memories. For example, memory for a traumatic car accident may be highly emotional and intense, but fragmented and incoherent when recalled. This high intensity and fragmentation, researchers have argued, are reflective of incomplete processing and special mechanisms involved in traumatic memories. Researchers often suggest these highly traumatic memories are either stored in a different location than "normal" memories or exist in the periphery of memory—just outside the bounds of purposeful, explicit recollection. McNally (2003) provides a historical summary of these special mechanisms approaches, which includes work from Horowitz (1976) and Van der Kolk and Fisler (1995).

Elhers and Clark (2000) provide one example of the special mechanisms required for the cognitive components of PTSD, with an emphasis on the re-experiencing and avoidance symptoms. Specifically, Elhers and Clark propose PTSD symptoms begin and persist because the individual has an incoherent and non-elaborated memory of the traumatic event. For Elhers

and Clark, traumatic memories are involuntarily recalled and attempted to be avoided because there are too few explicit linkages between the trauma memory and the "normal" memory system. Trauma memories lie in some peripheral, implicit memory area where the memories are under-connected or under-developed compared to everyday, or positive memories. Essentially, these traumatic memories have more classically conditioned aspects than most memories and rely on a simpler stimulus-response model of memory. As such, exceptionally traumatic or stressful memories require special cognitive mechanisms to allow for development and continuation of PTSD symptoms.

Rubin, Berntsen, and Bohni (2008) were the first to propose no special cognitive mechanisms were needed to understand PTSD symptomology. Instead Rubin and colleagues (2008) suggested traumatic memories are not under-developed, or under-integrated into the memory system, but instead over-integrated and perhaps too connected. This over integration is what causes the symptoms of PTSD. Specifically PTSD symptoms of can be understood as an over-connection or over integration of the traumatic event such that it linked or associated with many other aspects of the individual's memory system (e.g., sensory memories, thoughts about the future, awareness that the event may occur again leading to hyper-vigilance). Rubin, Dennis, and Beckham (2011) further refine and develop this cognitive model of PTSD and describe how individuals with PTSD symptoms do not demonstrate particularly incoherent traumatic memories, but instead have highly emotional and frequently rehearsed trauma memories. In their study, individuals with PTSD were actually more likely to report that the traumatic memory was an important part of their life story and that the trauma memory was highly centralized and over integrated with other aspects of their individual schema (Rubin et al., 2011). Thus, for these over-integration PTSD memory models, PTSD does not occur because the memories for the

event are peripheral or fragmented, but instead occur because memories for the traumatic event are over-represented and over-integrated into the memory system. Support for this model has been found in additional studies with results indicating the more an individual integrates a traumatic memory into his or her life-story or self-schema the greater the PTSD symptomology (e.g., Berntsen & Rubin, 2006; Boals & Schuettler, 2011; Rubin, 2011; Rubin, Boals, & Berntsen, 2008). Currently, researchers have labeled this process of over-integration of the trauma memory as event centralization or event centrality (Berntsen & Rubin, 2006).

What is event centrality?

The concept of event centrality is recognized in most cultures. One could not imagine a great work by Homer or Shakespeare without a character experiencing a traumatic or stressful event that leads to a "turning point" in the character, and inevitably, the story. Within psychology, however, event centrality has been addressed only recently. Berntsen (2001) was one of the first to indirectly address event centrality and questioned whether and how central an event became in one's life was dependent upon the valence, i.e., positivity or negativity, of the event. For example, although some life anchoring or life changing events are ostensibly positive, such as marriage or the birth of a child, other life changing events are potentially traumatic, such as the death of a parent or close loved one. Berntsen (2001) questioned whether intrusive or involuntary memories of trauma memories, e.g., flashbacks, were somehow different from other types of involuntary memories and questioned how event centrality might influence this involuntary recall. Berntsen's results indicated trauma memories are not especially fragmented or inaccessible compared to other types of positive autobiographical memories. Indeed, individuals who were trauma exposed were actually more likely to mention the trauma memories in their diaries and less likely to mention peak positive autobiographical memories. Berntsen

speculates that this trend may be due to the "unusually high intensity and consequentiality" of the traumatic event (p. S154, Berntsen, 2001). She hypothesized a traumatic event that had consequences and repercussions for the remainder of one's life may be more likely to be centralized or viewed as an important part of one's life story. Berntsen and Rubin (2006) formally labeled this trend of anchoring one's life around a traumatic event as event centralization. To measure event centralization they created the Centrality of Event Scale (CES) which assesses whether the event was a turning point, whether the event serves as a lens through which one views experiences, and whether this event is a central part of one's life story or narrative identity (refer to Appendix B for the CES).

High event centrality has been linked to poor mental health following a traumatic experience with research indicating those scoring high on the CES are also more likely to report high PTSD symptoms (e.g., Berntsen & Rubin, 2006; Boelen, 2012; Bohn, 2010; Rubin, Boals, & Hoyle, 2014). High event centrality has also been linked to worse physical health outcomes following trauma (Boals, 2010) and increasing PTSD symptoms over one year after the traumatic event (Boelen, 2012). Research suggests this trend is found across different cultural and ethnic groups with those reporting high event centrality also reporting high levels of emotional distress (Zaragoza, Salgado, Shao, & Berntsen, 2014). Similarly, high levels of event centrality are associated with overall maladaptive functioning (PTSD, alexithymia, stress, anxiety, and depression symptoms) but not positive aspects of adjustment such as resilience and positive affect (Bernard, Whittles, Kertz, & Burke, 2015).

Researchers have suggested the link between event centrality and PTSD symptoms is due to an over integration of the trauma memory into the person's life story leading to frequent intrusive memories of the trauma and subsequent attempts at avoiding trauma related stimuli

(Berntsen & Rubin, 2006; Schuettler & Boals, 2011). In the only meditational study to date, Boelen (2012) found evidence for this link with intrusiveness of the memory of the event, avoidance of reminders of the event, and rumination about the event all identified as mediators between event centrality and PTSD symptoms. Boelen notes, however, these results should be interpreted with caution as they are cross-sectional. As will be discussed later, researchers have grounded much of this causal research linking event centrality and PTSD on the *a priori* position that event centrality leads to PTSD. Recent research has emerged, however, that may indicate event centrality is not a predictor of PTSD symptoms but may actually be a PTSD symptom on its own (Broadbridge, 2013). Specifically, in the first study of its kind, Broadbridge found statistical support for the CES as a symptom cluster of PTSD, just as hyper-arousal, re-experiencing, and avoidance are symptom clusters of PTSD. Thus, it may be that event centrality is a reflection of PTSD symptomology as opposed to as a predictor of PTSD symptomology.

Why study refugees?

Each of the following studies will address how use of an Iraqi refugee sample aids in understanding event centrality, trauma, and PTSD. However, before discussing specifics of each study, it is important to note how many Iraqi refugees are displaced in the U.S. and the mental health difficulties they face upon arrival. Between 2007 and 2013 approximately 85,000 Iraqi refugees arrived in the U.S. (U.S. Citizenship and Immigration Services, 2013). Iraqi refugees are arriving to the U.S. after being displaced from a war-torn country that has consistently been rated as one of the worst offenders for human security and safety worldwide (Wood, 2010) and are often fleeing their Iraqi homes with few personal belongings and few monetary and social resources (Yako & Biswas, 2014). Upon arrival to the U.S., Iraqi refugees are often housed in

unsafe housing complexes, face language and acculturation difficulties, and are often subject to additional trauma and violence after arrival to the U.S. (Wright et al., under review; Yako & Biswas, 2014). Understanding event centrality and its role in PTSD is vital for the Iraqi refugee population given the number of displaced Iraqi refugees arriving to the U.S., the hardships they face both pre and post-displacement, and the individual and societal costs of poor mental health.

<div align="center">**Participant Selection and General Methodology**</div>

Participant Recruitment and Selection

Recruitment of participants was conducted between October 2010 and August 2011. Iraqi refugees were recruited via several local resettlement agencies: Arab Community Center for Economic and Social Services (ACCESS), Lutheran Social Services of Michigan (LSSM), Kurdish Human Rights Watch (KHRW), Catholic Services of Macomb (CSM), and the U.S. Commission on Resettlement and Immigration (USCRI). A contact person at each agency informed the research team when orientation meetings were scheduled with newly-arrived refugees. An Arabic-speaking member of the research team was present at each orientation meeting and presented information about the research study orally. Those refugees interested in participating provided written consent allowing researchers to contact them. A computer-generated random sample of 50-70% of those who were interested was selected each week, depending on the number of arrivals. In total, out of 501 interested and eligible refugees, 306 cases (61%) were randomly selected. These individuals were contacted by a member of the research team and given both oral and written information about the study; 98% of them (n=298) chose to participate. Recruitment criteria included being at least 18 years old, verifiable refugee status, and having recently arrived to the United States.

Data Collection and Attrition Over Time

Data were collected in three waves with all interviews using both self-report and clinical assessments via structured interview. Interviews were conducted in Arabic by a trained Arabic/English bilingual psychiatrist. Interviews were conducted in participants' homes, workplaces, community organizations, or other locations in the local community, in accordance with the participants' preference. Refugees received $35 gift cards for their participation in each wave of data collection.

Interviews, on average, took place within one month of arrival to the U.S. with the remaining interviews taking place approximately one year apart. Attrition over time was quite low. At Baseline 298 refugees were interviewed. At the 1st Follow-up 2% of the participants were lost to attrition with 291 completing the second wave of data collection. At the 2nd Follow-up 286 participants were interviewed with only 4% lost from the original sample.

Sample demographics have been provided in Table 1 with the Informed Consent Sheet provided to participants listed in Appendix A. The Human Investigation Committee at Wayne State University approved all materials and procedures in this study.

CHAPTER 2

Centrality of Event Scale: Reliability in a New Sample and Reliability Over Time

Berntsen and Rubin (2006) were the first to empirically validate a scale specifically focused on event centrality. Using a sample of undergraduates, Berntsen and Rubin assessed event centrality using the Centrality of Event Scale (CES) and demonstrated good to excellent internal consistency for both the short (7-item) and long (20-item) versions of the CES (α = .88 - .94). Additional studies have reported high internal consistency for the CES (e.g., Barton, Boals, & Knowles, 2013; Boelen, 2012; Rubin, Boals, & Hoyle, 2014).

Although the CES has been explored in veterans (Brown et al., 2010; Rubin et al., 2014; Staugaard et al., 2015), grieving adults (Boelen, 2009, 2012), and older adults (Bohn, 2010), most of the research examining the CES has been conducted using convenience samples of undergraduates. To the best of our knowledge, the CES has not been explored in a refugee sample. Refugees, by definition, are forced to relocate due to war, natural disaster, or fear of persecution and therefore are at an elevated risk of experiencing trauma and stressful events. As such, the CES's instructions to "think back to the most stressful or traumatic event in your life" may function differently for refugees. When compared to a U.S. undergraduate population, refugees are more likely to have been exposed to a greater number of potentially traumatic events and the intensity of these potentially traumatic events may be higher. By definition, all individuals must have a ***most*** stressful or traumatic event, but it is unknown how the CES functions in a population where trauma exposure is high and the individual has many possible candidate events competing for the ***most*** stressful or traumatic.

It is also unknown how the CES functions over time. To the best of our knowledge, the CES has only been administered to the same group twice for one study (Staugaard et al., 2015),

yet the authors did not report any details of how the CES functions over time. As such, temporal stability of the CES has not been examined. Rubin and colleagues (2014) note that although aspects of personality are unlikely to change over time (e.g., neuroticism; Costa, Herbst, McCrae, & Seigler, 2000), narrative identity and the events that form this narrative identity may change over time. Thus, there has been theoretical speculation that the CES may not demonstrate temporal stability, but no such empirical work has been conducted. However, unlike other aspects of personality, assessment of event centrality is complicated by its dependence on a particular preceding event. The centrality of an event may change if the event changes (e.g., one's most traumatic event is replaced by something more traumatic), if narrative identity or the life-story changes (McAdams et al., 2006), or if other aspects of mental health change, such as PTSD symptomology (refer to Study 3 in the current paper; Broadbridge, 2013). We acknowledge these aspects may affect temporal stability of event centrality over time; however, for the current study only the effect of actual time, i.e., the lapse of one year, is considered as we examine temporal stability in the CES.

Overview of the Current Study

Event centrality describes the extent to which a stressful or traumatic event has become an anchor point in one's life story and colors the way the individual views experiences. Event centrality, as measured by the Centrality of Event Scale (CES; Berntsen & Rubin, 2006), has demonstrated high internal consistency (Barton, Boals, & Knowles, 2013; Boelen, 2012; Rubin, Boals, & Hoyle, 2014). However, this high internal consistency has been established in predominately U.S. undergraduate populations. As such, it is unknown how the CES functions in a sample of trauma-exposed refugees. Additionally, whether event centrality is stable or

changes over time is unknown. The current study examines a group of Iraqi refugees across a two-year period to address the following hypotheses:

Hypothesis 1.

The CES will demonstrate excellent internal consistency at both measurement points. In the current study, internal consistency was considered excellent at $\alpha > .90$, which is in the higher ranges of acceptable internal consistency (George & Mallery, 2003).

Hypothesis 2.

The CES will demonstrate acceptable temporal stability across the two measurements. In the current study, temporal stability was assessed using a measurement invariance approach with structural equation modeling (SEM). Using this method, differing aspects of measurement are held constant to see which properties of the scale are stable from one time period to the next (e.g., is the variance for this item the same across time points?) (Little, 1997; Milfont & Fisher, 2010). This method of testing temporal stability is more rigorous and precise than test-retest reliability, and, as such, perfect temporal stability is rarely completely achieved in practice (Byrne, Shavelson, & Muthen, 1989; Vandenberg & Lance, 2000). Thus, for the current study, temporal stability was defined as adequate fit for Model 2, which would suggest the CES has the same number of items measured at each time point and the items are qualitatively similar across each time point (e.g., CES item 3 is functioning similarly at both measurement points). Additional details about measurement models and operational definitions for adequate fit are provided below in the Data Analysis section.

Method

Participants

Data were collected from 286 Iraqi refugees in metropolitan Detroit, Michigan. The sample included 155 male and 130 female participants with a mean age of 33.27 years (SD = 11.08) at the first measurement point. Recruitment criteria included being at least 18 years old, verifiable refugee status, and having recently arrived to the United States at the Baseline interview (M_{months} = 1.02, SD = 1.09, range = 0.00 to 5.40).

Measures

Participants completed the short form (7-item) version of the Centrality of Event Scale (CES; Berntsen & Rubin, 2006). Participants rated on a scale of 1 (strongly disagree) to 5 (strongly agree) the extent to which their most traumatic or stressful experience had become an anchor point, colored their thoughts about experiences, and was central to their narrative identity with higher scores on the CES reflecting higher event centrality. Refer to Appendix B for the CES and Table 2 for CES descriptive data across the two measurement waves. As all participants are Iraqi refugees and native Arabic speakers, the CES was translated from English to Arabic and back-translated to English to confirm acceptable translation.

Procedures

The CES was administered via structured interview with the two structured interviews conducted, on average, one year apart, referred to as 1st Follow-up and 2nd Follow-up. Interviews were conducted in Arabic by a trained Arabic/English bi-lingual psychiatrist. During the interview, the psychiatrist read each item and participants responded orally. Interviews were conducted in participants' homes, workplaces, community organizations, or other locations in the local community, in accordance with the participants' preference. Participants received a gift card for each wave of participation in the study.

Data Analysis

Five participants declined to respond to any CES items or responded to only one item, making multiple imputation impossible. These five individuals were dropped from the subsequent analyses (N=281). Seven missing responses were identified for 2nd Follow-up (0.36%). Multiple imputation was used to estimate these missing values (via IBM SPSS version 22).

Internal consistency (i.e., Cronbach's α) was assessed using IBM SPSS version 22. Consistency ratings were considered good at $\alpha > .80$ and excellent at $\alpha > .90$ (George & Mallery, 2003).

Examination of temporal stability was conducted using structural equation modeling (SEM) and the program LISREL 8.8 (Jöreskog & Sörbom, 2006). Maximum likelihood estimation method was used as it has been shown to provide the most accurate fit indices and parameter estimates when compared to other estimation methods such as weighted least squares (WLS) and generalized least squares (GLS) (Olsson, Foss, Troye, & Howell, 2010). Traditionally, test-retest reliability addresses the extent to which two sets of scores correlate over time (Allen & Yen, 2002). However, in the current study, the time between measurement points was approximately one year. Such a relatively long period between assessments may lead to conceptual and statistical difficulty with traditional test-retest assessment using correlations. The use of SEM, however, to examine temporal stability provides a more precise estimate of which aspects of the scale are similar or different over time (e.g., means, variances, factor loadings, etc.). In SEM this type of temporal stability is referred to as measurement invariance and is examined using a hierarchy of steps with increasingly strict parameters (restraints) across the two measurement points. Examination of the following six nested models is recommended to establish measurement invariance (Little, 1997; Milfont & Fisher, 2010):

Model 1: Form Model (All parameters to be estimated separately for each time point.)

Model 2: Pattern Model (Factor loadings are invariant across time points.)

Model 3: Scalar Model (Factor loadings and item means are invariant across time points.)

Model 4: Strict Invariance Model (Factor loadings, item means, and item residuals/error variances are invariant across time points.)

Model 5: Strict Invariance Model 2: (Strict Invariance Model plus latent variable means are invariant.)

Model 6: Strict Invariance Model 3: (Strict Invariance Model plus latent variable means and variances are invariant.)

Given the complex and iterative nature of these comparisons, figures have been provided to demonstrate which parameters were constrained at each step. These figures are presented in Appendix C. As each model added restrictions on the parameters to be estimated, the nested models were compared (i.e., does Model 2 have better fit than Model 1?). Criteria used to establish "better" model fit are described below.

SEM model fit was determined by examining both absolute and incremental fit indices. Absolute fit indices determine fit by comparing the reproduced covariance matrix and the original covariance matrix, measuring exact residuals, and comparing the residuals to chance estimates (Barrett, 2007). Thus, absolute fit indices examine how well an a priori model established by the researcher fit the collected data. Fit for the first absolute fit index, minimum fit function chi-square (χ^2), is established using the associated significance test. However, the chi-square test is negatively biased toward both large samples and variables with high bivariate correlations (Bentler & Bonett, 1980; Chen, Sousa, & West, 2005), both of which are present in the current sample. As such, critics vary on how stringent the chi-square and additional

goodness of fit indices should be (Barrett, 2007; Hu & Bentler, 1999). Fit for the second absolute fit index, Root Mean Square Error of Approximation (RMSEA) is considered adequate fit at < .08 and good fit at < .05 (Browne & Cudeck, 1992). Incremental fit indices determine model fit by comparing the reproduced model to the independence (null) model and provides an index of degree of discrepancy between the two models while accounting for degrees of freedom (Barrett, 2007). Thus, incremental fit indices compare the model provided by the researcher to the "everything is independent model" (i.e., no correlation between measured variables). Fit for both the incremental fit indices, Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI), is considered adequate at >.90 and above and good fit at >.95 (Browne & Cudeck, 1992).

When models are nested (i.e., the models include the same variables and the researcher only changes the pathways or relationships between the variables), comparison of fit indices between models is possible. Evaluation of the goodness of fit of one model over another model will be established in several ways. Ideally, chi-square would be used to establish a significant change in model fit as it has a significance test based on change in degrees of freedom (Steiger, Shapiro, & Brown, 1985). However, chi-square is known to be affected by sample size (Chen, et al., 2005) and it can be overly sensitive to change when many constraints are placed on a given model (Little, 1997). As such, changes in chi-square were interpreted with caution. Decreases in RMSEA, NNFI, and CFI of 0.01 or more will be considered a significant change when comparing nested models (Chen, 2007). Finally, overall model parsimony will be considered. Model parsimony refers to models that have the highest number of degrees of freedom compared to the null or baseline model (McDonald & Marsh, 1990). Researchers consider model parsimony a reflection of good fit as the more relationships that are hypothesized (i.e., the more arrow/relationships that are drawn in SEM), the greater the likelihood that one is capitalizing on

chance, over-fitting the data, or finding otherwise spurious results (Marsh, & Hau, 1996). Thus, a model that constrains the most parameters (i.e., estimates the fewest relationships) is seen as most parsimonious.

Additionally, factor loadings were examined for significance to ensure each item was loading on its respective latent variable. Squared multiple correlations (SMCs) for each item were also examined to determine the amount of variance in each latent variable associated with that particular item that is not due to measurement error (Jaccard & Wan, 1996) with SMCs >.30 considered good (Albright & Park, 2009).

All LISREL syntax for Hypothesis 2 testing has been appended (Appendix M).

Results

Hypothesis 1

The CES will demonstrate excellent internal consistency at both measurement points. In the current study, internal consistency was considered excellent at $\alpha > .90$, which is in the higher ranges of acceptable internal consistency (George & Mallery, 2003).

The CES demonstrated excellent internal consistency at both measurement points with 1st Follow-up Cronbach's $\alpha = .93$ and 2nd Follow-up $\alpha = .90$. Descriptive statistics across the two measurement waves are presented in Table 2.

Hypothesis 2

The CES will demonstrate acceptable temporal stability across the two measurements.

Temporal stability of the CES over time was examined using factor invariance testing in SEM. Specifically, the six nested models were compared and assessed for improvements in fit compared to less restrained models. Visual depiction of this process is presented in Appendix C.

Model 1: Form Model (All parameters to be estimated separately for each time point.)

Model 2: Pattern Model (Factor loadings are invariant across time points.)

Model 3: Scalar Model (Factor loadings and item means are invariant across time points.)

Model 4: Strict Invariance Model (Factor loadings, item means, and item residuals/error variances are invariant across time points.)

Model 5: Strict Invariance Model 2: (Strict Invariance Model plus latent variable means are invariant.)

Model 6: Strict Invariance Model 3: (Strict Invariance Model plus latent variable means and variances are invariant.)

Fit indices, detailed in Table 12, indicate poor to borderline adequate fit for most of the indices used. For example, Model 6: Strict Invariance Model 3 was identified as having a RMSEA of .23 (recommended cut-off <.08) which suggests very poor fit while the NNFI was .89 (recommended cut-off of >.90) which suggests borderline adequate fit. This similar pattern was found for all of the models tested. However, Hu and Bentler (1995) emphasize the strength of model testing in SEM comes from both consideration of model fit indices and from comparison of models tested. As such, Hu and Bentler caution against focusing on the absolute cut-off values for fit indices (e.g., a CFI >.90) and instead consider how one model fits when compared to a competing model. Using this recommendation, examination of fit indices and changes in fit indices, Tables 12 and 13, respectively, indicate Model 6: Strict Invariance Model 3 has significantly better RMSEA fit and NNFI fit when compared to other models and does not have significantly worse χ^2 fit than the proceeding models. Thus, it could be argued that although none of the models tested had adequate fit, Model 6 was not significantly worse in fit than the other models. Examination of the factor loadings in Table 14 indicates significant loadings for each of the items in Model 6. Additionally, examination of the squared multiple

correlations (SMCs) for Model 6 in Table 14 indicates high SMCs for all of the items except for CES 2 ("This event has become a reference point for the way I understand myself and the world."). When combined, these results suggest consideration of Model 6 as the best fitting model of the models tested as it did not demonstrate significantly worse fit than the competing models, demonstrated acceptable item factor loadings and SMCs, and was the most parsimonious (i.e., the least amount of pathways to be estimated).

Data Screening Follow-Up

In order to understand possible reasons for the objectively poor fit indices, follow-up data screening of both measurement waves using LISREL was conducted. Results indicate many "straight-line" responses for the entire CES (e.g., "Disagree" response for all seven items). Specifically, 140 of 281 (50%) respondents at the 1st Follow-up and 157 of 281 (55.9%) respondents at the 2nd Follow-up reported a consistent "Disagree" pattern with a relatively small number of other participants responding with other "straight-line" responses (e.g., all "Undecided" responses). This response pattern was masked by consideration of individual items (e.g., what is the mean of CES 4?) and was not evident until the entire CES scale was considered as a whole. In order to better understand the poor fit, all "straight-line" responders were removed from the sample and analyses were re-run. Specifically, all participants reporting the same response for all items (e.g., all "Totally Disagree", all "Undecided", etc.) at either measurement period were dropped from the sample. This resulted in removal of approximately 66% of the sample (187 cases of 281 dropped) leaving 94 participants. Using this sub-sample, both hypotheses were re-tested.

Hypothesis 1

Results for Hypothesis 1 indicated a decline in internal consistency when the straight-line responders were removed. Specifically, for the 1st Follow-up Cronbach's α declined from .93 to .83 and for the 2nd Follow-up the internal consistency dropped from $\alpha = .90$ to $\alpha = .82$. These values are still within the range that is considered adequate internal consistency (i.e., $\alpha > .80$; George & Mallery, 2003); however, they are notably lower than the internal consistency values that were reported when using the entire sample. Examination of individual items indicates removal of CES Item 2, which was associated with poor fit in Hypothesis 2, would not dramatically increase the internal consistency of the scale. A more thorough discussion of CES Item 2 is included in the Discussion below.

Hypothesis 2

Results for Hypothesis 2 remained un-changed. Again, fit-indices were poor to borderline adequate and Model 6 did not fit significantly worse than competing models, demonstrated acceptable factor loadings and SMCs, and was the most parsimonious. Objectively poor fit in this sample that had been thoroughly data screened is concerning. However, the sample size of 94 is below the recommended cut-off for SEM (rule of thumb > 200 participants) (Kline, 2005) and at small sample sizes none of the fit indices behave adequately (Hu & Bentler, 1995), thus the small number of participants in this sub-sample is likely responsible for the poor fit. Possible causes and effects of this response pattern are discussed below.

Discussion

Results from Hypothesis 1 and Hypothesis 2 suggest event centrality, as measured by the CES, is internally consistent and may be temporally stable over a one-year period. Specifically, the CES demonstrated excellent internal consistency for Hypothesis 1 with high Cronbach's alphas for both measurement waves. Although the Cronbach's alphas declined when straight-

line responders were dropped from the sample, the internal consistency values were still within the recommended range. These results suggest each of the seven CES items are assessing the same construct, namely event centrality. Results from SEM invariance testing for Hypothesis 2 were less clear, however, with results suggesting Model 6 does not demonstrate significantly worse fit than the competing models and is the most parsimonious model. Acceptance of Model 6 suggests all aspects of the scale are similar over time including aspects such as associations between the items and the latent variable (i.e., factor loadings) as well as total scale score variability (i.e., latent construct variance). Results from Hypothesis 2, however, should be interpreted with caution as none of the models tested met the recommended cut-off values for adequate fit.

Model Fit and Response Patterns for the CES

In practice, Models 3—6 are rarely established (Byrne, Shavelson, & Muthen, 1989; Vandenberg & Lance, 2000). As such, that these models demonstrated poor model fit for some of the fit indices (e.g., RMSEA) is not necessarily surprising and it was hypothesized Models 3 – 6 may demonstrate poor fit. However, such a high RMSEA for the initial baseline model, Model 1, does indicate larger concerns with the data. Examination of individual response patterns for the entire scale indicated approximately 66% of the respondents were quite consistent within the scale and over time with "straight-line" responses for all items on the CES. This lack of variance in responses leads to statistical difficulties that no amount of advanced statistical techniques can correct. As described above, removal of these "straight-line" participants resulted in a sample size too small for effective SEM analyses (n=94).

This pattern of responses also raises methodological concerns. Prior researchers have found the quality of the responses decline as participants grow fatigued or bored with survey

questions. This phenomenon has been referred to as participant or respondent fatigue (Ben-Nun, 2008) and has been documented across a range of populations and survey content. Participants who are fatigued often decline to respond to survey items (Hoerger, 2010), misrepresent or inaccurately report responses in order to complete the survey (Lehnen & Reiss, 1978), or engage in "straight-line" responding where they respond to all the items with the same answer (Galesic & Bosnjak, 2009). Specifically, prior research has found questions at the end of a questionnaire may be responded to differently than if they were at the beginning of the survey (Helgeson & Ursic 1994). Although no absolute rule exists, researchers examining participant fatigue suggest surveys of no more than 20 minutes to ensure quality data (Rathod & LaBruna, 2005). In the current study the CES was administered at the end of the interview following a series of 215 and 237 questions in the 1st and 2nd Follow-ups, respectively, with surveys taking approximately two hours to complete. Given the pattern of responses in the current study and length of the survey, it is likely many participants engaged in "straight-line" responding for the CES items and that if the CES had been presented at the beginning of the interview more variability in responses might have been found.

CES Item 2

CES Item 2, "This event has become a reference point for the way I understand myself and the world," loaded onto the Event Centrality latent construct thus indicating CES Item 2 is a valid measure of event centrality. However, examination of the squared multiple correlations for CES Item 2 indicates the latent variable of Event Centrality does not explain much of the variance in CES Item 2. Thus, CES Item 2 is associated with the theoretical latent construct of Event Centrality but knowing one's Event Centrality score would not necessarily be helpful in predicting the response for the individual indicator of CES Item 2. Importantly, this trend was

present for both measurement waves. However, examination of internal consistency for the CES

when Item 2 was deleted indicated that dropping CES Item 2 would not notably improve the

scale's internal consistency.

One possible explanation for the low squared multiple correlations for CES Item 2 may

lie in the language used for the scale. In the current study all CES items were translated to

Arabic and then back-translated to English to ensure accuracy of language and consistency in the

content of the items regardless of the language. However, translation of survey items, especially

items related to abstract concepts such as viewing an event as a "reference point," is difficult. It

is possible some aspect of CES Item 2 was lost in the translation and back-translation process.

CES Item 2 was associated with its latent construct of Event Centrality, but it does seem to be

underperforming compared to the six other CES items. Any future research examining the CES

in this sample should be cognizant of this concern. Follow-up analyses by other CES researchers

could examine whether CES Item 2 demonstrates similar concerns across different populations

and different trauma exposures.

Limitations and Future Directions

As described above, the pattern of responses, although consistent, may reflect a

methodology concern. Somewhat paradoxically the major limitation from the current study,

which was designed to examine consistency and stability, is the consistent and stable pattern of

"straight-line" responses for approximately 66% of the respondents across the two measurement

waves. Without variance even advanced statistical techniques, such as structural equation

modeling, are untenable. Future research examining temporal stability of the CES should be

aware of participant fatigue during long interviews and CES placement in the questionnaire.

Finally, results from the present study should be interpreted with caution as the study methodology did not allow for comparison of CES events over time. Refugees are a highly trauma exposed group and, as will be discussed in the following study, individuals who are highly trauma exposed are more likely to be exposed to additional traumatic experiences in the future. Thus, it is possible that the most traumatic event for a participant at 1st Follow-up was no longer the most traumatic event at the 2nd Follow-up. As such, examination of temporal stability in the current study relies on the assumption that the most traumatic or stressful event did not change from one year to the next. Future research examining CES stability should ensure participants are referencing the same event over time by having the participants describe the most traumatic or stressful event to which they are referring. Relatedly, future research should note if participants want to change or replace their most traumatic or stressful memory as this change in the most traumatic memory would be helpful in understanding the relationship between trauma, event centrality, and PTSD over time.

CHAPTER 3

Centrality of Event Scale: Cumulative Trauma vs. Trauma Types

If trauma is bad, then is more trauma worse? This question lies at the core of the dose-response model of PTSD which posits that as an individual's exposure to trauma increases, the more likely it becomes that he or she will experience adverse mental health symptoms in response (March, 1993; Marshall, Schell, Elliott, Berthold, & Chun, 2005; Mollica, McInnes, Poole, & Tor, 1998; Ogle, Rubin, & Siegler, 2014; Zoladz & Diamond, 2013). This model is intuitively appealing as it follows other dose-response models found in many areas of health sciences and medical research. Research examining event centrality has had little to say about the "dose" of the traumas experienced, which is surprising given event centrality's relationship to PTSD, a mental health outcome that has been hypothesized to follow the dose-response pattern. If more traumas lead to more mental health problems then one could ask whether more traumas increase the risk of negative change in the identity of the individual. And, if so, what form that negative change might take.

With regards to event centrality, are some traumas worse than others? Perhaps due to the sensitive nature of operationalizing or scoring the severity of trauma, researchers examining event centrality seem to have strategically avoided answering this question directly. Instead, as will be described below, at least some researchers have argued the "objective nature of potentially traumatic events is unrelated to mental health" (p. 802, Boals & Schuettler, 2011). This method seems to imply an outsider's assessment of the severity of the trauma is irrelevant if the individual is sufficiently "traumatized" by an event. As discussed below, however, recent research has found differing types of traumatic events have distinct effects on mental health.

Does this imply that differing types of traumas also have distinct effects on later event centralization?

It is these two questions: 1.) Whether and how cumulative trauma affects event centrality?, and 2.) Whether and how differing trauma types affect event centrality?, that are addressed in the current paper.

Trauma and Event Centrality

Addressing trauma type and/or severity

Prior research examining event centrality has approached the preceding traumatic or stressful event in one of three ways. In the following section, these three methods are referred to as the "not disclosed trauma," "minimum necessary trauma," and the "same trauma," respectively.

For the first method, or the "not disclosed trauma", no actual detailing of the trauma is required on the part of the participant. Participants are asked to reflect on the most stressful or traumatic event in their lives but no explicit reporting of the traumatic event is required (e.g., Berntsen & Rubin, 2006; 2007; Rubin, Boals, & Hoyle, 2014). By not requiring participants to describe their most stressful or traumatic memory, participants may consider the traumatic event without fear of disclosure or stigma. As such, these participants may be more willing to reflect on the emotional aspects of the event and report without some type of cultural or social desirability bias because they not required to disclose their trauma to a stranger, even if the response is made anonymously. However, this method of assessing trauma and event centrality does not allow for comparisons of event characteristics. For example, two participants could report the same event centrality score with one participant recalling his most stressful event as the natural death of a beloved family pet while another participant recalls her most stressful

event as being carjacked at gunpoint as she was pumping gas in her neighborhood. Although their event centrality scores may be the same, subjectively and objectively the events they considered their most stressful or traumatic differ.

Using the second method, or the "minimum necessary trauma", participants are asked to consider the most stressful or traumatic event, briefly detail this event, and self-report on whether this event met the A1 and/or A2 criteria for a PTSD diagnosis. Use of this method allows for comparison of event centrality between those individuals who may qualify for a PTSD diagnosis using the A1 and/or A2 criteria versus those who objectively did not experience an event that would meet diagnosis for PTSD. For example, Berntsen and Rubin (2006) had participants respond to both the A1 and A2 criteria while Boals and colleagues (2012) had participants respond to only the A1 criteria, "Did you experience, witness, or confront an event that involved actual or threatened death or serious injury to your physical integrity or that of others?" This approach ensures that although the reported events vary, the event does at least meet the basic *DSM* criteria for a traumatic event. One limitation of this method is the variability in experiences qualifying as traumatic event (e.g., military combat, being robbed, hearing of an unexpected death of a family member or friend, experiencing a natural disaster, etc.). As such, researchers using this method can be confident the traumatic event meets the A1 and/or A2 criteria, however, differentiating how trauma type impacts event centrality may be difficult due to the various types of trauma exposure.

Lastly, using the "same trauma" approach studies examining event centrality are conducted where participants have all experienced the same type of traumatic event, such as losing a close loved one or living through a terrorist attack, and respond to the CES with this event in mind (e.g., Berntsen & Rubin, 2006; Boelen, 2009, 2012; Blix, Solberg, Heir, 2014;

Brown et al., 2010). By standardizing trauma type, researchers can examine other relationships that may be influencing the event centrality such as age, time since the traumatic event, unexpectedness of the event, or individual characteristics such as neuroticism. For example, Boelen (2012) examined event centrality for those who had lost a close loved one. By standardizing the traumatic event, Boelen was able to test variables mediating the relationship between event centrality and poor mental health, such as event characteristics (e.g., suddenness of the death of the loved one) and cognitive variables (e.g., intrusiveness of memories of the event). This approach allows researchers to more precisely examine individual characteristics that may impact event centrality and to also examine the effect of differing event characteristics on event centrality. One notable drawback of this approach, however, is that only one trauma type has been examined per study. Thus, it is unknown how different trauma types are related to event centrality, such as how having a traumatic event occur to the self compares to having a traumatic event happen to a close loved one.

Limitations of prior event centrality research.

To date, no research has reported the effects of cumulative trauma on event centrality. Nor has a specific comparison been conducted to examine how differing trauma types affect event centrality. This is surprising as prior research examining event centrality has asked questions which would allow for these comparisons. Previous event centrality research has measured cumulative trauma using checklists of potentially traumatic events such as the Traumatic Life Events Questionnaire (TLEQ; Kubany et al., 2000). However, the bulk of this research has only used the checklist to prompt participants to consider possible traumatic events they may have experienced (e.g., Barton, Boals, & Knowles, 2013; Berntsen, Rubin, & Siegler, 2011; Boals & Schuettler, 2011; Schuettler & Boals, 2011). For example, Barton and colleagues

(2013) asked participants to respond to a 13-item questionnaire asking about prior abuse, assaults, accidents, deaths, etc. The authors reported these events using descriptive methods (e.g., 1.5% of the sample reported being physically assaulted) but made no comparisons by trauma type or total trauma experienced. In other studies no information is provided about the number or type of traumatic events and instead the reader is left to assume the data collected about cumulative traumatic events or the type of events is unrelated to event centrality (Berntsen et al., 2011; Boals & Schuettler, 2011; Schuettler & Boals, 2011). Rubin and colleagues (2011) offer a notable exception to this trend by reporting the cumulative number of traumas experienced and cumulative trauma's association with other variables of interest (e.g., PTSD symptoms). However, these authors do not report any information regarding the relationship between event centrality and cumulative trauma exposure. Additionally, for all the aforementioned studies, no researchers examined the effects of specific types of trauma on event centrality. Thus, data were available to compare event centrality between those who had been physically assaulted versus those who had experienced the violent death of a loved one; yet, these comparisons were not included in the reported analyses.

These omissions may be both theoretical and methodological. Theoretically, event centrality is predicated on one event becoming over integrated and central to one's life story. By definition, a participant can only have one event currently considered *most* stressful or traumatic. All other events, regardless of how stressful or traumatic, must be considered at least slightly less stressful or traumatic than the *most* traumatic or stressful. Thus from a purely theoretical analysis, the cumulative number of traumatic events experienced may not be of interest for those interested in the most stressful or traumatic event and event centrality thereafter. With regards to methodological constraints, prior research using trauma checklists has been conducted mostly

using an undergraduate population. Researchers may have been uninterested in making comparisons for event centrality by trauma type given the infrequency with which specific types of traumatic events were experienced and the large sample sizes required to make valid comparisons.

Why Iraqi refugees?

Refugees offer a unique opportunity to explore these previous methodological and theoretical limitations. First, refugees are a known trauma exposed group as, by definition, refugees are forced to relocate due to war, natural disaster, or fear of persecution. Iraqi refugees are at such a heightened risk for pre-displacement traumatic experiences that a traumatic events checklist has been created specifically for this population, the Harvard Trauma Questionnaire Traumatic Events Component—Arabic version (HTQ; Shoeb, Weinstein, & Mollica, 2007). Research consistently demonstrates Iraqi refugees experience high levels of aggregate pre-displacement trauma as measured by the HTQ, including: exposure to physical beatings, abduction of close loved ones, persecution due to religious practices, and lack of food and water (e.g., Hijazi et al., 2014; Nickerson et al., 2014). Recent research has also emerged indicating the HTQ may be better conceptualized as a checklist for differing sub-types of trauma instead of simply an aggregate checklist. Specifically, Arnetz and colleagues (2014) found sorting the HTQ into five different trauma sub-types explained more variance in mental health symptoms than did using a cumulative measure of pre-displacement trauma exposure. Using factor analysis, Arnetz and colleagues identified five distinct trauma sub-types within the HTQ questionnaire, including: Physical Trauma to Self, Physical Trauma to Others, Abduction of Family Member or Friend, Lacking Necessities, and Persecution/Coercion. In order to examine the validity of these trauma sub-types, the authors predicted PTSD symptoms using two different models. First, they used

cumulative trauma exposure to predict PTSD symptoms. Results indicated cumulative trauma scores were associated with 7% of the variance in PTSD symptoms. Second, they used the five aforementioned trauma sub-types to predict PTSD symptoms and found that Physical Trauma to the Self was actually a stronger predictor for PTSD symptoms than was cumulative trauma. Specifically, Physical Trauma to the Self associated with 8% of the variance in PTSD symptoms. With regards to other trauma sub-types, Lack of Necessities was also associated with significant variance in PTSD symptoms, however, the relationship was smaller in magnitude (i.e., 3% of the variance).

Additional research supports this trend of examining specific types of trauma when considering mental health. For example, Leaman and Gee (2012) found sexual torture, but not other types of torture such as deprivation of basic needs like food, was predictive of PTSD symptoms for a group of African torture survivors. Other researchers have found that for Iraqi refugee adolescents, racially motivated interpersonal trauma that occurred after being displaced to the U.S. is predictive of PTSD symptoms above and beyond the variance in PTSD symptoms associated with cumulative lifetime trauma exposure (Kira, Lewandowski, Chiodo, & Ibrahim, 2014). Additional research indicates the type of trauma may not matter as much as the perpetrator of the trauma. Goldsmith and colleagues (2012) found victims of betrayal trauma, i.e., when victims knew and were close to the victimizer, reported the greatest number of psychological symptoms when compared to those who were not close to or did not know the perpetrator.

When combined this evidence suggests examining trauma and event centrality in Iraqi refugees can provide insight into two research questions. First, what is the effect of cumulative trauma on event centrality? As Iraqi refugees have been exposed to a high number of potentially

traumatic pre-displacement events, examination of the effects of cumulative trauma will be possible. Compared to average undergraduate populations with which most prior event centrality research has been conducted, an Iraqi refugee sample is likely to have experienced a greater range of potentially traumatic events. This variance, in turn, should allow for statistical examination of the effects of cumulative trauma on event centrality. Second, does the type of traumatic event experienced affect event centralization? Prior PTSD research has indicated differing trauma types have differing relationships with mental health outcomes. However, due to methodological and small sample size constraints, prior event centrality research has been unable to compare event centralization for differing types of trauma. In the current sample of Iraqi refugees, all participants report exposure to potentially traumatic events, however, their specific exposure differs. Comparison of event centralization for individuals who experienced differing types of trauma (e.g., physical assault compared to lack of food/water), would allow for an understanding of how differing types of trauma impact event centralization.

Overview of the Current Study

This study examines two questions concerned with the traumatic event(s) that precede event centrality and integration of the traumatic event(s) into one's life story. First, does the total number of reported traumatic events that one is exposed to affect event centrality? Previous theoretical understanding of event centrality has posited the centralization of the *most* traumatic or stressful event is of interest due to its associations with mental health variables such as PTSD. Some high-risk groups, such as Iraqi refugees, however, have been exposed to multiple potentially traumatic events. Yet, we have little understanding how event centrality functions for an individual who has many, many stressful and/or traumatic events to sort through when choosing the *most* traumatic or stressful memory. As such, this study examines how cumulative

trauma exposure is related to event centrality. Second, does the type of traumatic event affect later event centralization? Research examining mental health outcomes indicate the type of trauma does matter. Specifically, certain types of trauma, such as physical trauma to the self have strong associations with psychological distress symptoms when compared to other types of trauma such as persecution or coercion. However, perhaps due to theoretical and/or methodological constraints, prior research has not examined whether the specific type of trauma experienced affected how central the event was to the person's life. This study seeks to fill this gap by using an established measure of trauma sub-types to determine whether exposure to certain traumatic events is associated with event centrality.

Hypothesis 1.

Cumulative trauma exposure will predict event centrality. If event centrality follows a dose-response pattern as PTSD is speculated to follow, those reporting the highest pre-displacement cumulative trauma will also report the highest event centrality scores. This effect will remain after controlling for known predictors of trauma exposure, such as age (being older), gender (being male), and education (lower education levels).

Hypothesis 2.

Differing trauma sub-types will predict event centrality. Specifically, using the established trauma sub-types of Arnetz and colleagues (2014), individuals reporting physical trauma to the self (e.g., physically assaulted, kidnapped, being taken hostage), will report significantly higher event centrality scores. Additionally, given the findings of Arnetz and colleagues, it is hypothesized those reporting a lack of necessities (e.g., lack of food/clean water, having no access to medical care, lacking shelter) will also report significantly higher event

centrality scores. These effects will remain after controlling for known predictors of trauma exposure, such as age (being older), gender (being male), and education (lower education levels).

Method

Participants

Data were collected from 290 Iraqi refugees in metropolitan Detroit, Michigan. The sample included 152 male and 129 female participants with a mean age of 33.34 years ($SD =$ 11.24) at the first measurement point. Recruitment criteria included being at least 18 years old, verifiable refugee status, and having recently arrived to the United States at the Baseline interview ($M_{months} = 1.02$, $SD = 1.09$, range $= 0.00$ to 5.40).

Procedures

All measures were administered via structured interview with both interviews taking place approximately one year apart, referred to as Baseline and 1st Follow-up, respectively. Structured interviews were conducted in Arabic by a trained Arabic/English bi-lingual psychiatrist. During the interviews the psychiatrist read the questions aloud and the participants responded orally. Interviews were conducted in participants' homes, workplaces, community organizations, or other locations in the local community, in accordance with the participants' preference. Participants received a gift card for their participation in each wave of study.

Measures

Participants completed a demographics measure which included gender, age, and education.

Centrality of events scale.

At the 1st Follow-up participants completed the short form (7-item) version of the Centrality of Event Scale (CES; Berntsen & Rubin, 2006). Participants rated on a scale of 1

(strongly disagree) to 5 (strongly agree) the extent to which their most traumatic or stressful experience had become an anchor point, colored their thoughts about experiences, and/or was central to their narrative identity with higher scores on the CES reflecting higher event centrality. Refer to Appendix B for the CES and Table 2 for CES descriptives at the 1st Follow-up. As all participants are Iraqi refugees and native Arabic speakers, the CES was translated from English to Arabic and back-translated to English to confirm acceptable translation. Cronbach's alpha for the CES was 0.93.

Pre-displacement trauma.

Pre-migration exposure to traumatic experiences and violence was measured at Baseline using the traumatic event component of the Harvard Trauma Questionnaire (HTQ), Arabic version (Shoeb, Weinstein, & Mollica, 2007). Each participant was asked to respond either "Yes" or "No" as to whether he or she had experienced 39 events such as "being beaten up," "witnessing execution of civilians," or "being kidnapped" before coming to the U.S. The HTQ Arabic version is specifically designed to assess trauma and torture in an Iraqi population with the full questionnaire listed in Appendix D. Descriptive information for the HTQ and its subscales are detailed in Table 3.

Two scoring methods were used to assess the HTQ. First, all pre-displacement trauma experiences were aggregated into a single cumulative trauma score ranging from 0 (no trauma) to 39 (highest reported trauma). Second, the trauma sub-types identified by Arnetz and colleagues (2014) were used to create five trauma sub-type scores, specifically: Physical Trauma to Self, Physical Trauma to Others, Abduction of Family Member or Friend, Lacking Necessities, Persecution/Coercion. These five trauma sub-types were the sum of the reported number of traumas within each sub-type. For example, the Physical Trauma to Others trauma sub-type is

composed of seven items; thus, possible scores for this variable ranged from 0 (no trauma of this sub-type) to 7 (highest possible trauma of this sub-type). The itemization for each of the five trauma sub-types has been listed in Appendix E.

Data Analysis

All data were screened for missing values. Two different participants responded to only one of the seven CES items. One participant declined to respond to any pre-displacement trauma questions. These individuals were dropped for all subsequent analyses (final n =287). No other missing data were identified. All analyses were conducted using IBM SPSS version 22. All *p*-values were set to a two-value of .05.

For both hypotheses, hierarchal multiple regression analyses were conducted. For Hypothesis 1, control variables known to be associated with exposure to traumatic events, i.e., age (being older), gender (being male), and education (being less educated), were entered in step one. For the second step, cumulative pre-displacement trauma exposure, measured at Baseline, was entered into the regression analysis. For Hypothesis 2, control variables were entered for step one (i.e., age, gender, and education) and then each of the five trauma sub-types were entered for step two of the regression analysis. Models were assessed for overall model fit, an increase in model fit when cumulative trauma or the trauma sub-types are entered into the second step, and squared semi-partial correlations (e.g., proportion of unique variance).

Results

Hypothesis 1

Cumulative trauma exposure will predict event centrality. If event centrality follows a dose-response pattern as PTSD is speculated to follow, those reporting the highest pre-displacement cumulative trauma will also report the highest 1st Follow-up CES scores. This

effect will remain after controlling for known predictors of trauma exposure, such as age (being older), gender (being male), and education (lower education levels).

Table 15 details the regression results for Hypothesis 1. For the first step, which included the control variables, the overall model was significant ($F(3,286) = 8.06$, $p < .001$). Of the control variables, only age was associated with increasing CES scores with those who were older reporting increasing CES scores. For the second step, inclusion of cumulative trauma exposure, the overall model was also significant ($F(4,282) = 12.73$, $p < .001$), and demonstrated significantly improved prediction than step one of the model (R^2 change = .07, $F(1,282) = 24.72$, $p < .001$). As hypothesized, refugees with higher cumulative pre-displacement trauma exposure were significantly more likely to report higher CES scores. Specifically, cumulative trauma exposure accounted for 7% of the unique variance in CES scores. Addition of pre-displacement trauma to the model significantly increased the overall R^2 with the final model accounting for 15% of the variance in CES scores. For the second step of the model, again being older was associated with increasing CES scores.

Hypothesis 2

Differing trauma sub-types will predict event centrality. Specifically, individuals reporting physical trauma to the self (e.g., physically assaulted, kidnapped, being taken hostage), will report significantly higher CES scores at the 1st Follow-up. Additionally, it is hypothesized those reporting a lack of necessities (e.g., lack of food/clean water, having no access to medical care, lacking shelter) will also report significantly higher event centrality scores. These effects will remain after controlling for known predictors of trauma exposure, such as age (being older), gender (being male), and education (lower education levels).

Hypothesis 2 results are presented in Table 16. Step one of the model, controlling for known predictors of trauma exposure, was significant ($F(3,282) = 8.27$, $p < .001$) with older adults reporting higher CES scores than younger adults. Step two of the model, using trauma sub-types to predict CES scores, was also significant ($F(8,277) = 18.90$, $p < .001$) with a significant increase in prediction over step one of the model (R^2 change $= .27$, $F(5,277) = 23.31$, $p < .001$). The hypothesis was partially supported with refugees reporting higher instances of physical harm to the self also reporting higher CES scores. This relationship accounted for 25% of the unique variance in CES scores. However, no significant relationship was found between high reported lack of necessities and higher CES scores. The final model, including all the trauma sub-types, accounted for 35% of the variance in CES scores. Again, of the control variables, age remained a significant predictor with older adults reporting higher CES scores.

Discussion

Results supported Hypothesis 1 and partially supported Hypothesis 2. Specifically, those who reported the highest number of cumulative of pre-displacement traumas reported higher CES scores. As discussed below, these results suggest event centrality and PTSD symptom scores follow a similar trend regarding exposure to cumulative trauma—greater trauma is predictive of higher symptoms. Additionally, higher exposure to physical harm to the self was associated with increasing CES scores, although the other trauma sub-types did not display similar patterns. Again, this suggests event centrality and PTSD symptoms share a similar pattern when comparing differential effects of trauma sub-types.

Cumulative Trauma and Event Centrality

To date, this is the first study to examine the impact of cumulative trauma exposure on event centrality. Previous research has focused exclusively on the relationship between

cumulative trauma exposure and PTSD symptoms with a strong positive relationship typically reported (e.g., Breslau et al., 1999). However, as the results in the present study indicate, a positive relationship also exists between cumulative trauma exposure and event centrality. Thus, at least in this one sample, PTSD and event centrality follow similar patterns after high cumulative trauma exposure.

From a theoretical perspective, it is interesting to consider how cumulative trauma exposure would cause higher event centrality scores for one's *most* stressful or traumatic event. Given previous research examining trauma, event centrality, and PTSD, two distinct mechanisms are hypothetically responsible for this relationship.

First, prior research examining PTSD has noted individuals who experience one traumatic event are more likely to experience another traumatic event. Sexual assault victims, for example are more likely to experience additional sexual assaults or re-victimization than individuals who have never been sexually assaulted (Arata, 2000; Smith, Davis, Fricker-Elhai, 2004). In a manuscript under review based on this sample of refugees, similar trends were found with refugees who reported high pre-displacement trauma exposure also reporting high post-displacement trauma exposure (Wright et al., under review). When combined, these results suggest a similar pattern—trauma begetting trauma. Some researchers have proposed this relationship exists because of an inability or reluctance to properly assess risk leading the trauma victim to be exposed to a greater number of risky situations, some of which, inevitably, turn into traumatic or stressful events (Allen & Lauterbach, 2007; Smith et al., 2004; Stein et al., 2002). It is also possible the cognitive load of PTSD symptoms is what starts the trauma begetting trauma cycle. Exposure to a traumatic event may lead to PTSD symptoms, such as disturbed sleep and agitation, which may decrease working memory capacity and attentiveness, then leading to

increasing risk for an additional traumatic event (McCart et al., 2012; Park et al., 2014). Similarly, a traumatic event could happen (i.e., Trauma 1), with subsequent event centrality (i.e., CES 1) which may lead to feelings of hopelessness and a sense of identity where "bad things happen to me" thus leading to another traumatic event (i.e., Trauma 2), with subsequent event centrality (i.e., CES 2). This cycle of trauma could lead to increasing PTSD symptoms, more trauma, and, eventually, higher CES scores. Although it is impossible to tease apart this relationship in the current sample, future event centrality research may be able to ask specific questions about the traumatic events including the timing, cause and effect relationship, and ranking of consequentiality.

A second possible explanation for the positive relationship between cumulative trauma exposure and event centrality may be due to lack of specificity in the CES instructions. When participants complete the CES they are asked to think of the *most* stressful or traumatic event but the term "event" is never clearly defined. As addressed earlier, some event centrality researchers would categorize all the participants in this study as refugees and assume their CES scores were all comparable just as prior CES researchers examining terrorist attack victims (Blix et al., 2014) and soldiers have made the same assumption (Brown et al., 2010). These researchers would be uninterested in the number or type of traumas experienced, as the assumption would be the CES score would measure the *most* traumatic event and that this *most* traumatic event would be related to the refugee experience.

However, it may be that some refugees in this sample considered the entire refugee experience their *most* traumatic memory. As currently written, the CES instructions could allow an individual to look back on an entire life period and consider the consequentiality and centrality of this period instead of a specific event. Indeed, it may be that individuals who

experienced a high number of traumatic events are more likely to see these events as connected and string them together as the same "event", thus leading to higher CES scores. A refugee who reported two traumatic events may have an easier time identifying his or her *most* traumatic event and responding to CES items without spillover from other experiences. Conversely, a refugee reporting 12 traumatic events may have difficulty identifying the *most* traumatic event and instead lump these experiences together as "that time in my life" or "right before I fled" and respond to CES items with many events in mind. This cognitive searching strategy of using lifetime periods (e.g., the time right before I fled) instead of a specific event (e.g., when I saw the woman executed) has been well documented in autobiographical memory research (Conway & Pleydell-Pearce, 2000). If one's *most* traumatic event is a highly stressful life period then the CES is accurately assessing life-story centrality, but necessarily event centrality. Although it is impossible to do in the current study, clarifying the participant instructions so that an "event" is clearly defined would be one method of assessing these contamination concerns. Another method of understanding this possible use of a life period instead of an event would be to examine CES scores for those with many traumas that are, at least superficially and temporally, unrelated (e.g., a car wreck at 18, sexual assault at 30, etc.).

Trauma Sub-Types and Event Centrality

Refugees who reported high instances of physical harm to the self also reported the highest CES scores. To date, this is the first study to specifically examine the impact of trauma sub-types on event centrality.

This finding extends previous research linking differences in PTSD symptoms by trauma sub-type (Arnetz et al., 2014) by demonstrating trauma sub-type also has an effect on event centrality. Specifically, results from the current study mirror the findings of Arnetz and

colleagues (2014) in that the trauma-sub type of physical trauma to the self accounted for more variance in the outcome, in this case CES scores, than did cumulative trauma or any of the other trauma sub-types. More generally, results from the current study are consistent with prior research reporting certain types of trauma (e.g., rape) are more likely to result in a PTSD diagnosis when compared to traumas like car accidents (Kessler et al., 1995).

Why is one specific trauma sub-type is so strongly associated with increasing CES scores? When Berntsen originally conceptualized event centrality, she proposed CES scores may be due to the "unusually high intensity and consequentiality" of the traumatic event (p. S154, Berntsen, 2001). Physical trauma to the self as defined in the current study and in Arnetz et al. (2014) includes physical assault, being kidnapped, and being taken hostage. Each of these traumas could have long-lasting physical and psychological consequences. Follow-up examination of the descriptions of the trauma reveal several of the kidnapping victims were also assaulted and still suffer from poor health due to the kidnapping and physical assault. For example, one participant reported armed men kidnapped him as he was driving, burned him, hit him on the head and knee, and that he still has difficulty walking due to the knee injury. One could imagine how an event such as this would become highly central to the life story. Additionally, the finding that physical trauma to the self was associated with higher CES scores is consistent with prior research examining trauma severity. Traumas that meet the A1 and A2 criteria for PTSD (actual or threatened death or injury and fear, hopelessness, or horror, respectively) are found to have higher CES scores than traumas that only meet one or neither of the criteria (Boals et al., 2012).

Yet other trauma sub-types should also be highly consequential and may also meet the A1 and A2 criteria. The trauma sub type "Abduction of a family member or friend trauma"

includes traumas such as a violent murder of a child and abduction of a spouse. How could increasing exposure to such consequential events not be associated with the increasing CES scores? As mentioned previously, PTSD and trauma-type research indicates multiple factors are involved in understanding PTSD symptoms including whether the victim knew the perpetrator of the trauma (Goldsmith et al., 2012) and even a sense of higher purpose for experiencing the trauma (Basoglu et al., 1994; Holtz, 1998). Thus PTSD symptoms are not simply an objective and easily calculated score after trauma exposure. This same nuanced relationship may be true for trauma type and event centrality. Event centrality is influenced by not just the trauma experienced but the cognitions and emotions before, during, and after the trauma exposure. For participants in the current study, there may be cognitive and emotional aspects of the refugee role that are influencing their CES scores. For example, being a refugee, by definition, forces the individual to leave behind community and close loved ones. A traumatic event like the kidnapping of a friend may have different consequences and long-term effects if the friend, and that community, were thousands of miles away and were likely to never be seen or visited again. As such, event centrality for some of these traumatic experiences might be lower than one would expect due to the nature of the refugee experience. In contrast, other traumatic events, such as being kidnapped or tortured, remain salient and central to the life-story regardless of the location or surroundings because the individual him or herself was more central to the event. Similarly, non-significance for the hypothesized relationship between lack of necessities and higher event centrality scores, may be due to the same pattern. Refugees who experienced a lack of shelter before being displaced to the U.S. may not necessarily integrate that event into his or her life story and, with time, this event may become less salient whereas another type of traumatic event, such as being tortured, may continue to be central to the self and identity.

Limitations and Future Directions

The most notable limitation of the present study is the inability to determine exactly which trauma refugees were referencing when considering their *most* stressful or traumatic event. Although this limitation may have been partially mitigated by follow-up analyses, the methodology of the current study does not allow for precise examination of the type of trauma experienced. As described in the literature review, this problem is not unique to the current study as no other studies examining event centrality have made comparisons between trauma types. Nevertheless, future research should more thoroughly examine the impact of specific trauma type on subsequent event centrality. Although this study examined refugees who reported many trauma exposures, the nature of separating these traumas into sub-types drastically reduced power and ability to make meaningful comparisons. Future research should be aware of this concern and recruit many hundreds, if not many thousands of participants when examining the impact of specific trauma on event centrality. Similarly, a meta-analysis of the available event centrality research may be feasible where different types of traumas are compared.

Additionally, the current study statistically controlled for known risk factors for trauma exposure, such as age, gender, and education. However, for some of these variables statistically controlling for these effects may be an accepted solution, but perhaps not the only solution. If one adopts a broader causal model it is possible the relationship between the control variables and event centrality partially works through the number or type of traumatic events experienced. For example, the older adults may have higher CES scores, but this trend may be working through the type of trauma experienced (e.g., death of a loved one versus lack of necessities). If trauma plays this meditational role, then examining the relation between the trauma and event

centrality measures controlling for age does not make theoretical sense. As such, future research could examine the possible mediating relationship between age (independent variable), cumulative trauma or trauma sub-type (mediator), and event centrality (dependent variable).

CHAPTER 4

Centrality of Event Scale: Predicting or Reflecting Mental Health

Given its distinct position in the *Diagnostic and Statistical Manual (DSM)* as the only mental health disorder with an etiology which must be defined and described, posttraumatic stress disorder (PTSD) cannot help but invite discussion of cause and effect (5th ed., *DSM-5*, American Psychiatric Association, 2013). Recent research reflects this questioning with researchers asking whether PTSD symptoms are actually precursors of PTSD (DiGangi et al., 2013), if "traditional" PTSD symptoms vary widely depending on the culture (Hinton & Lewis-Fernandez, 2010), and if the special memory mechanisms thought to create PTSD are not so special after all (Rubin, Boals, & Berntsen, 2008). When combined these studies, along with others, indicate researchers agree that PTSD may have a core definition, but can not exactly agree on what PTSD is—specifically how it begins, what individual and event factors can predict later PTSD symptoms, and why/how PTSD symptoms may vary in different cultural groups. The present study seeks to explore these concerns by addressing two questions: (1) Does event centrality, thought to be a predictor of PTSD, actually serve as a reflector, or symptom, of PTSD? (2) Can event centrality be considered a valid and reliable measure of PTSD symptoms in a sample of participants from a cultural group where mental illness is highly stigmatized?

PTSD: Cause and Effect

With regards to the initial cause of PTSD, there is fairly consistent agreement—namely that a stressful or traumatic event must precede the onset of symptoms (for rare exception refer to Mol et al., 2005). Yet most individuals will experience an event that would meet the A1 and A2 criteria for PTSD diagnosis (e.g., life threatening situation and fear, hopelessness, and horror, respectively; Ozer, Best, Lipsey, & Weiss, 2003) although only a fraction of these individuals

clinically satisfy PTSD criteria (Bonanno, 2004). Research indicates the relationship between trauma and PTSD is mediated by individual differences (e.g., resilience; Bonanno, 2004), characteristics of the trauma (e.g., sexual torture compared to other torture; Leaman & Gee, 2012), and cultural / contextual elements (e.g., social support; Hall, Bonanno, Bolton, & Bass, 2014). Research also indicates individuals experiencing the same traumatic event may have vastly different psychological responses with the objective rating of the trauma often having little relationship with the PTSD symptoms in the individual (Boals & Schuettler, 2011; Rubin, Boals, & Berntsen, 2008). However, it is beyond the scope of the present paper to challenge the etiological nature of PTSD. Instead, the above description is provided to demonstrate that the "cause" side of the equation for PTSD is nuanced at best and mystifying at worst.

What does research say about the other side of the PTSD equation—namely the "effects" or symptoms of PTSD? PTSD was first identified in the *DSM* 3rd edition and included three symptom clusters: (1) re-experiencing the event, (2) avoidance of reminders of the event or emotional numbing caused by the event, and (3) hyper-arousal or disturbed arousal (3rd ed., *DSM-III*, American Psychiatric Association, 1980). This symptomology has remained generally unchanged through to the current *DSM-5* (5th ed., *DSM-5*, American Psychiatric Association, 2013) although the second cluster, which focused on avoidance and numbing, has now been split into two symptom clusters, avoidance and numbing, respectively. Researchers examining PTSD have examined these symptom clusters using multiple methods, the bulk of which can be categorized into two types: a diagnostic approach and a symptom approach. For diagnostic assessments, PTSD symptoms are evaluated for a threshold and once this threshold for symptomology has been met a PTSD diagnosis is warranted; if, however, the symptom threshold is not met then no PTSD diagnosis is given (5th ed., *DSM-5*, American Psychiatric Association,

2013). An example of the specific symptoms and thresholds needed for diagnosis is included in

Appendix F. This diagnostic approach is required in clinical practice as the *DSM,* by definition,

necessitates it. For researchers, this approach is considered the "gold standard". However, this

diagnostic approach requires a trained interviewer and has to be assessed individually. As such,

the diagnostic approach to PTSD for research purposes is relatively infrequently used. Instead,

most researchers employ some type of self-reported symptom checklist with items corresponding

to the *DSM* criteria for a PTSD diagnosis. An example of this is the 17-item PTSD Checklist

(PCL) – Civilian version (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Ruggiero,

Del Ben, Scotti, Rabalais, 2003) which has been included in Appendix G. In the PCL, individual

items address the same symptoms evaluated during diagnostic assessments (e.g., re-experiencing,

avoidance, numbing, hyper-arousal), but the participant self-reports these items and, most

importantly, a total symptom score is reported regardless of the diagnosis. Irrespective of the

method of assessment, however, the symptomology of PTSD remains the same—those with

PTSD should exhibit some level of re-experiencing, avoidance, numbing, and hyper-arousal.

However, two seminal articles recently questioned the core symptomology of PTSD.

Specifically, researchers have asked whether PTSD is a valid construct with distinct symptoms

(Rosen & Lilenfeld, 2008) and if perhaps some core symptoms of PTSD are actually causes of

the syndrome (DiGangi et al., 2013). In the first meta-analysis of its kind, DiGangi and

colleagues suggest specific PTSD "symptoms" are present prior to the originating trauma, thus

suggesting these symptoms are not PTSD symptoms at all. These researchers review evidence

indicating many variables thought to be symptoms of PTSD such as hyper-arousal and avoidance

tendencies, may actually be antecedents of PTSD. DiGangi and colleagues report that across

different prospective studies, individuals who exhibited hyper-arousal tendencies (e.g., startle

reflexes) and avoidance (e.g., avoidant coping styles) before the traumatic event were more likely to be diagnosed with PTSD after experiencing the traumatic event. Although each of these studies were previously published, DiGangi and colleagues were the first to aggregate such a relatively large number of prospective studies (N=54) examining how the "cause" and "effect" sides of PTSD align. Similar research has emerged examining Danish soldiers before, during, and after deployment with results suggesting some soldiers who "develop" PTSD symptoms after deployment are actually demonstrating PTSD symptoms prior to deployment (Berntsen et al., 2012; Berntsen & Rubin, 2014). Given the etiological nature of PTSD, these claims may signal a future paradigm shift in how researchers conceptualize PTSD symptoms and who is likely to experience traumatic events.

Event Centrality: Predicting PTSD?

Event centrality was originally conceptualized as a method of understanding how different types of events could become central to the identity of an individual, such as the centrality of a wedding versus centrality of the death of a loved one (Berntsen, 2001). From this framework the Centrality of Event Scale (CES; Berntsen & Rubin, 2006) emerged which was designed to assess the extent to which a negative event became central to the identity of the individual. From the onset of the conceptual development of the CES, its relationship with PTSD symptomology was predictive. Across differing samples and methodologies, researchers conceptualize the CES as a "cause" side of the PTSD and, as such, the CES has been used to predict or account for variance in PTSD diagnoses and / or symptoms (e.g., Berntsen & Rubin. 2007; Boals, Hayslip, Knowles, & Banks, 2012; Boals & Schuettler, 2011; Rubin, Boals, & Hoyle, 2014).

The use of event centrality as a predictor of PTSD is likely fourfold. First, as discussed in the General Introduction, over integration of the traumatic event into the memory system is likely a contributing factor in development of PTSD (Rubin, Boals, & Berntsen, 2008; Rubin, Dennis, Beckham, 2011). Thus, if a negative event is highly centralized then it should be frequently considered (i.e., re-experienced) but wished to be thought of less often (i.e., avoidance) and may lead to emotional and physiological changes in the person (i.e., numbing and hyper-arousal) (Rubin, Boals, & Berntsen, 2008). As such, use of the CES as a predictor of PTSD is in line with CES's theoretical underpinnings and the symptomology of PTSD. The CES was designed to measure why some individuals have greater PTSD symptomology whereas others do not; thus, theoretically the CES predicts PTSD symptoms.

The second reason event centrality has been exclusively utilized as a predictor of PTSD is that event centrality, by its very nature, requires the negative event to have already occurred and, as such, cannot be examined prospectively. One cannot centralize an event that has not yet taken place. How CES is best conceptualized has gone unaddressed and its inability to be examined prospectively deserves attention. The tendency to centralize an event cannot be an individual characteristic or a personality trait given that it requires a preceding event that may not occur to everyone. Previous researchers have noted CES is positively correlated with certain personality traits including rumination and neuroticism (Barton, Boals, & Knowles, 2013; Boelen, 2009; Rubin, Boals, & Hoyle, 2014). Yet, researchers are moot on when and how exactly CES enters the "trauma = PTSD" equation. The bulk of the literature seems to indicate trauma can lead to event centralization that can then lead to PTSD (e.g., Berntsen & Rubin, 2006). Boelen (2012) offers the only study to date to explicitly examine the causal mechanisms between event centrality and PTSD, however, even in this study how event centrality arises or develops is not

discussed. Instead, as with other research, Boelen suggests trauma leads to event centrality, which then, through various mediators, leads to high PTSD symptoms. Given this hypothesized chain of events, that event centralization settled into a position as a predictor of PTSD is not surprising.

Thirdly, and speculatively, event centrality has been considered a predictor of PTSD because changing the existing criteria for PTSD would be a long, difficult research agenda. As mentioned previously, Rosen and Lilenfeld (2008) published a thorough and insightful criticism of PTSD as the *DSM-IV-TR* had operationalized it (4th ed., *DSM-IV-TR*, American Psychiatric Association, 2000). The authors "found virtually all core assumptions and hypothesized mechanisms lack compelling or consistent empirical support" (p. 837, Rosen & Lilenfeld, 2008) and ended the review with a call for thoughtful consideration of PTSD in the *DSM-5*. Their suggestions and criticisms were essentially unaddressed in the new edition of the *DSM-5*. One could imagine a similar fate for researchers suggesting an entirely new symptom cluster for the *DSM-6* PTSD criteria.

Finally, perhaps the strongest reason researchers view event centrality as a predictor of PTSD is that correlation in cross-sectional research is often seen as a good predictor for longitudinal and causal research. CES is correlated with PTSD symptom scores in the .40 to .60 range (e.g., Berntsen & Rubin, 2006; Ogle, Rubin, & Siegler, 2014), which is bordering on multicollinearity (Tabachnik & Fidell, 2007). For all the studies reviewed for the present paper, the bivariate relationship between CES and PTSD symptomology was always significant and positive. If a researcher wanted a promising variable to "predict" PTSD symptomology, event centrality would certainly top the list. It is important to note, however, the distinction between a predictor and a concurrent characteristic. Theoretically speaking, a true predictor is associated

with a variable over time such that changes in the predictor at one time point objectively and measurably lead to changes in the outcome at another time point. However, a concurrent characteristic requires no such association over time. Instead concurrent characteristics only necessitate that the variables be associated cross-sectionally. Introductory statistics courses reinforce this idea with the phrase "correlation does not equal causation". Yet, frequently researchers minimize or ignore this axiom.

Event Centrality: Reflecting PTSD?

As the above review indicates, researchers are still grappling with both the causes of PTSD and, how, exactly PTSD symptomology should be assessed. Also, as addressed above, one consistent predictor for PTSD symptomology appears to be event centrality. But, statistically speaking event centrality has not been validated as a true "predictor" of PTSD. Thus, it is possible event centrality is an additional symptom cluster, an "effect" of PTSD instead of a "cause". Yet, to date only one study has specifically tested if event centrality is an "effect" of PTSD (Broadbridge, 2013), even though research has consistently reported statistical support for the consideration of event centrality as an additional symptom cluster of PTSD. For example, when examining PTSD symptom scale scores, CES scores have been correlated as high as .58 with PTSD symptoms (Brown, Antonius, Kramer, Root, & Hirst, 2010), which is nearing test re-test reliability for many established scales. As described previously, this high bivariate correlation is not anomalous (e.g., Berntsen & Rubin, 2006; Ogle et al., 2014).

There are two exceptions to this unequivocal trend of using event centrality as a predictor of PTSD symptoms. First, Boelen (2012) examined possible mediators between event centrality and PTSD symptoms. In this study, Boelen found the relationship between the CES and PTSD symptoms is almost completely mediated through memory intrusiveness, grief

misinterpretations, depressive avoidance, and rumination. Boelen's findings are noteworthy as they indicate the relationship between the CES and PTSD is not perfectly causal (i.e., a change in CES must lead to a change in PTSD symptoms). Broadbridge (2013), however, offers the only explicit study examining whether event centrality is a "cause" or "effect" of PTSD. In Study 1 of the dissertation, Broadbridge found support for event centrality as a symptom cluster of PTSD with the CES functioning much like the established PTSD symptom clusters of re-experiencing, numbing, avoidance, and hyper-arousal. Specifically, support was found for a higher order model where PTSD symptom clusters, including event centrality, are distinct but related symptoms occurring because of the same mental health problem—namely PTSD. For a visual depiction of a similar model refer to Figure 4. Although Broadbridge's methodology allowed for both exploratory and confirmatory factor analysis of this model, the sample population included a non-clinical convenience sample of undergraduates. Use of a different sample, specifically trauma exposed Iraqi refugees, may yield different results.

Why examine Iraqi refugees?

Iraqi refugees have been exposed to many potentially traumatic events, including: torture, religious persecution, witnessing death and executions, lack of food and water, among other traumas (e.g., Hijazi et al., 2014; Nickerson et al., 2014). As such, one would assume PTSD prevalence rates are exceptionally high. However, data indicate trauma exposed refugees have between a 0% chance to a 99% chance of developing PTSD (Carlson, 1991; De Jong, et al., 2000; Hashemian et al., 2006; Steel et al., 2005). These findings are further complicated by findings that PTSD prevalence rates have been reported at 1.1% for people living in Iraq (Alhasnawi et al., 2009) even though Iraq is consistently rated among the worst environments for human security (e.g., widespread murders, torture, disappearances, kidnappings, and executions)

(Wood, 2010). What can explain this low PTSD diagnosis and symptom rate in such a highly traumatized population? One explanation, which has empirical support, is that the social and cultural stigma that often accompanies mental health disorders appears to be intensified in Middle Eastern and Arab cultures (Ciftci, Jones, & Corrigan, 2012; Kulwicki, 2002). Participants from these cultural backgrounds frequently underreport and/or somatize symptoms to avoid being diagnosed with a mental health disorder (Barkho, Fakhouri, & Arnetz, 2011; Erickson & Al-Timmi, 2001). This cultural shame and stigma does not just apply to the individuals experiencing the mental illness, but also to the family (Youssef & Deane, 2006). As such, many individuals may actively avoid discussions of poor mental health and underreport symptoms for questions that are explicitly addressing mental health.

One method of addressing poor mental health in these Iraqi refugees may lie in event centrality. Comparison of the PCL (Appendix G) and the CES (Appendix B), indicate the CES does not have clear face validity for measuring PTSD symptoms as there are no questions in the CES addressing mood, anxiety, poor functioning, or any of the other symptoms that many in the general population associate with PTSD. This lack of face validity may be a benefit when measuring PTSD in a community where mental illness is so highly stigmatized. Individuals who are hesitant to disclose symptoms of nightmares and flashbacks may be more likely to disclose that the traumatic event has influenced the way they think about the world. Of course, understanding whether event centrality is a symptom of PTSD is important for all cultural groups. However, for those from the Middle East and Arab cultures, knowing event centrality's relationship to PTSD may be critical.

Event Centrality as a Symptom Cluster: Criterion Validity

If event centrality is a symptom cluster of PTSD it should not only demonstrate statistical similarity with the other PTSD symptom clusters, but also be associated with poor global functioning. PTSD, as currently defined, has been associated with a heightened risk for poor social functioning, including increased risk for: unemployment (Possemato, McKenzie, Mc-Devitt-Murphy, Williams, & Ouimette, 2014; Silove, Sinnerbrink, Field, Manicavasgar, & Steel, 1997), poor social support (Hall, Bonanno, Bolton, & Bass, 2014; Possemato et al., 2014), additional exposure to traumatic events (Brewin, Andrews, & Valentine, 2000; Orcutt, Erickson, & Wolfe, 2002; Polusny, et al., 2011) and daily chronic stress (Brewin et al., 2000; Miller & Rasmussen, 2010; Possemato et al, 2014). In addition, PTSD has also been associated with poor physical health, including increased risk for: chronic diseases (Barrett et al., 2002; Boscarino, 2006), unhealthy body mass index (BMI; Kubzansky et al., 2014), sleep apnea (Arnetz, Templin, Saudi, & Jamil, 2012; Krakow, Ulibarri, Moore, & McIver, 2014), and poorer subjective health ratings (Barrett et al., 2002; Hoge, Terhakopian, Castro, Messer, & Engel, 2007; Schnurr & Spiro, 1999). Examining event centrality's relationship to these variables, which have previously been linked to PTSD, would provide further evidence of the CES as a symptom cluster of PTSD.

Overview of the Current Study

With the exception of one study within a dissertation, previous research has focused exclusively on event centrality as a predictor or "cause" of PTSD. Specifically, those who experience trauma and then centralize this trauma to their life story will demonstrate the highest PTSD symptoms. However, it may be that the CES actually reflects PTSD. The theoretical underpinnings of the CES and the very nature of PTSD may have prevented previous researchers from considering event centrality as a symptom. However, for certain cultural and ethnic groups

where mental illness is highly stigmatized, use of the less face-valid CES as an effective and reliable measure of PTSD symptoms would be instrumental.

Hypothesis 1

Event centrality, as measured by the Centrality of Event Scale (Berntsen & Rubin, 2006), is a reflector, or symptom of PTSD, as opposed to a predictor of PTSD. Four models were examined to test this hypothesis.[1] Specifically:

Model 1: Correlated Variables Model. "Predictor" (Figure 1).

Model 2: Correlated Variables and Symptoms Model. "Predictor" (Figure 2).

Model 3: Higher Order Model. "Reflector" (Figure 3).

Model 4: One Factor Model. "Reflector" (Figure 4).

Models 1 and 2 represent "Predictor" models where CES is distinct from PTSD symptoms. Models 3 and 4 represent "Reflector" models where CES is a symptom of PTSD. If, as previously suggested by researchers, CES predicts PTSD symptoms then Models 1 and 2 should demonstrate the best fit. If, however, as hypothesized in the current paper, CES is a symptom of PTSD then Models 3 and 4 should demonstrate better fit than Models 1 and 2.

Hypothesis 2.

If event centrality is a symptom of PTSD, then high scores on the CES should be associated with poor global functioning thus demonstrating criterion validity for the CES as a reliable and valid measure of PTSD symptomology. In order to test this hypothesis, comparisons

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[1] It is important to note these models are technically mediation models. Specifically, pre-displacement trauma is a pre-cursor or preceding variable for both CES and PTSD. This trend applies regardless of the model. For example, for Models 1 and 2, the theoretical model would be TRAUMATIC EVENT → CES → PTSD. Conversely, for Models 3 and 4, the theoretical model would be TRAUMATIC EVENT → PTSD/CES SYMPTOMS. We acknowledge the role of pre-displacement trauma in understanding event centrality (see Study 2 of the current paper). However, for theoretical and statistical reasons, pre-displacement trauma exposure is not included in Study 3.

were made to determine whether those high in CES also report greater unemployment, post-displacement trauma, daily hassles, chronic diseases, BMI, and sleep apnea, as well as lower levels of social support, self-rated health, and predicted self-rated health. It was predicted those higher in event centrality would also report poor global functioning across this spectrum of variables listed above. It is important to note, these analyses included CES scores as the final step in the models after controlling for age, gender, education, and PTSD symptoms. Thus, any models where the CES is a significant predictor would indicate it represented unique variance above and beyond traditional PTSD symptoms (i.e., re-experiencing, avoidance/numbing, and hyper-arousal).

Method

Participants

Data were collected from 281 Iraqi refugees in metropolitan Detroit, Michigan. The sample included 152 male and 129 female participants with a mean age of 34.24 years ($SD =$ 11.15) at the first measurement point. Recruitment criteria included being at least 18 years old, verifiable refugee status, and having recently arrived to the United States ($M_{months} = 1.01$, $SD =$ 1.09, range = 0.00 to 5.40).

Procedures

All measures included were administered via structured interview with three total interviews conducted approximately a year apart. Interviews are referred to throughout as Baseline, 1st Follow-up, and 2nd Follow-up, respectively. Structured interviews were conducted in Arabic by an Arabic/English bi-lingual psychiatrist. During the interview the psychiatrist read each item and participants responded orally to each question. Interviews were conducted in participants' homes, workplaces, community organizations, or other locations in the local

community, in accordance with the participants' preference. Participants received a gift card for their participation in each wave of the study.

Measures

All participants responded to sociodemographic information at each interview. Certain sociodemographic variables were assessed only once, at Baseline, including: age, gender, length of time in the US, and transition time to arriving in the U.S. (i.e., months in transit between leaving Iraq and arriving in the U.S.). Other variables, which may change over time or were unable to be calculated using initial data, were assessed at each interview, including: marital status, education, current living situation, and employment status. Descriptive information for the sample can be found in Table 1.

Centrality of event scale.

Participants completed the short form (7-item) version of the Centrality of Event Scale (CES; Berntsen & Rubin, 2006). Participants rated on a scale of 1 (strongly disagree) to 5 (strongly agree) the extent to which their most traumatic or stressful experience had become an anchor point, colored their thoughts about experiences, and/or was central to their narrative identity with higher scores on the CES reflecting higher event centrality. Cronbach's alpha for the CES was .91 at 2nd Follow-up with descriptive data for each wave presented in Table 2. CES items are presented in Appendix B. Note that for the current study, only 2nd Follow-up CES scores are used.

For Hypothesis 1 testing, individual CES items from the 2nd Follow-up were used for analyses. For Hypothesis 2 testing, 2nd Follow-up CES scores were summed to create a CES scale score.

Posttraumatic stress disorder.

PTSD symptoms were assessed using the 17-item PTSD Checklist (PCL) – Civilian version (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Ruggiero, Del Ben, Scotti, Rabalais, 2003). The PCL items mirror the re-experiencing, avoidance/numbing, and hyper-arousal symptoms of PTSD listed in *DSM-IV-TR* (4th ed., *DSM-IV-TR*, American Psychiatric Association, 2000). Participants indicated on a 5-point scale how much they were bothered by each symptom in the past month. Cronbach's alpha for the total PCL score in this study was .94. Appendix G lists the specific PCL items with descriptive data over time presented in Table 4. Note that the current study only uses the 2nd Follow-up PCL scores.

For Hypothesis 1 testing, 2nd Follow-up individual PCL items were used for analyses. Symptom clusters were identified using the *DSM-IV-TR,* which describes three symptom clusters including re-experiencing, avoidance/numbing, and hyper-arousal (4th ed., *DSM-IV-TR*, American Psychiatric Association, 2000). These three symptom clusters have also been identified by researchers in a sample of Middle Eastern trauma survivors (Bal & Jensen, 2007). For Hypothesis 2 testing, 2nd Follow-up PCL scores were summed to create a PCL symptom score.

Post-displacement trauma.

Post-displacement exposure to traumatic experiences and violence was measured at each structured interview. At Baseline all participants responded to the 39-item Harvard Trauma Questionnaire (HTQ) for any traumatic events applying since their arrival to the U.S. (Shoeb, Weinstein, & Mollica, 2007). As the average refugee in this sample had only been in the U.S. for one month, reported post-displacement trauma exposure at Baseline was low. Additionally, many HTQ items applied to trauma more likely to occur in Iraq. (e.g., "Serious physical injury due to combat situation or landmine"). In order to assess exposure to potentially traumatic

events in the U.S., HTQ items applying to wartime trauma were replaced with items more relevant for a U.S. context (e.g., "Have you been in a car accident?"). This post-displacement trauma questionnaire is referred to as United States Trauma Questionnaire (USTQ) and was assessed at 1st Follow-up (37-items) and 2nd Follow-up (39 items). Baseline HTQ referencing trauma since arrival to the U.S. and the two USTQ assessments were summed to create a post-displacement trauma score ranging from 0 to 115 with higher scores reflecting greater exposure to potentially traumatic events since arrival to the U.S. Post-displacement HTQ items and USTQ items are presented in Appendix H. Descriptive data at each interview are presented in Table 5.

Daily hassles.

Daily hassles were measured at each interview using a ten-item checklist focused on chronic, daily hassles, e.g. "How often do you experience problems with your spouse?", with the remaining nine questions addressing problems with money, children, parents, relatives, safety, transportation, language, finding employment, and problems at work. Response alternatives ranged from 0 (Never/Hassle Does Not Apply) to 5 (Almost Always). Given the nature of the hassles, items were dichotomized with scores of 0, 1, and 2 coded as "No Hassle" and scores of 3, 4, and 5 coded as "Hassle Present". Within each time point, individual items were summed and treated as a count variable with scores ranging from 0 (no reported hassles) to 10 (maximum number of hassles). These three measurement waves were then summed to create a cumulative score representing overall hassles since arrival to the U.S. with scores ranging from 0 to 30. The specific daily hassles assessed are detailed in Appendix I. Descriptive information across the three measurement waves are presented in Table 6.

Social support.

Social support was assessed at each interview using a 5-item questionnaire designed to measure the availability and use of social support. Though not an established scale, the items were found to be psychometrically sound with internal consistency ranging from .77 to .83 across the three interviews. Appendix J details each item and Table 7 provides item descriptive data over time. Social support scores were summed across the three measurement waves to create a cumulative social support score reflecting social support since arrival to the U.S. with scores ranging from 15 to 75.

History of unemployment.

At the 2nd Follow-up participants responded to the dichotomous item, "Have you worked since coming to the U.S.?". This item was used to assess a history of unemployment since arriving in the U.S. approximately two years prior.

Health measures.

As physical health is a multifaceted construct, multiple measures were employed to assess health.

Self-rated health and predicted health.

At each interview participants responded to two questions regarding their perception of their own health. Specifically, were asked, "How would you rate your general health today?" and "How do you expect your general health to be in one year?" with response options ranging from 1 (Poor) to 5 (Excellent). These items are referred to as self-rated health (SRH) and predicted self-rated health (PSRH) with descriptive data over time presented in Table 8. SRH and PSRH were summed across each wave of measurement to create a total SRH and total PSRH score, respectively. Thus, SRH and PSRH represent the participant's rating of his or her health or predicted health since arriving to the U.S.

Chronic diseases.

Physician diagnosed chronic diseases were self-reported at each interview. Participants were asked to respond, "Yes" or "No" as to whether they had been diagnosed with 12 disorders. Items assessed at each interview are described in Appendix K. Descriptive information over time has been included in Table 9. Chronic diseases were summed across all three measurement waves to create a score of the cumulative number of physician diagnosed chronic diseases before or since arriving to the U.S.

Body mass index.

Body mass index (BMI) was assessed at each interview. Participants did not calculate their respective BMI. Instead participants were asked their height and weight in whichever metric they felt comfortable (i.e., inches/feet, meters/centimeters, pounds, kilograms). BMI was then calculated by a researcher using the appropriate formula (Centers for Disease Control and Prevention (CDC), 2014). BMIs over time as well as CDC guidelines regarding healthy BMI are detailed in Table 10. BMIs were averaged across all three measurement waves to create an average BMI score.

Sleep apnea.

During 2nd Follow-up participants responded to six-items addressing sleep apnea symptoms. Participants first responded "Yes" or "No" to the question, "Do you snore?". If participants responded "Yes" to this item, they then responded to five additional items focused on specific symptoms related to snoring, difficulty breathing during sleep, tiredness when waking, and tiredness during the day. For participants who responded these items (n=79, 28% of the total sample), responses were summed to create an aggregate sleep apnea score ranging from 5 (few symptoms) to 25 (many symptoms). Items in this sleep apnea scale demonstrated good

internal consistency (α = .83). Appendix L lists the scale items and descriptive data have been included in Table 11.

Data Analysis

All data were screened for missing values. Missing data from scales were imputed using IBM SPSS Version 22, including: seven missing values from the CES (.36 % missing), nine missing values from the PCL (.19% missing), and five missing values from the social support scale (.36% missing). Single items, count, or checklist variables were also screened for missing values, although given the nature of these measures, no missing values were imputed, including: one missing value for unemployment (.04% missing), 15 missing values for post-displacement trauma (.05% missing), 126 missing values for daily hassles (1.49% missing), 14 missing values for chronic diseases (.42%), and 17 missing values for sleep apnea (4.30% missing). Internal consistency for all scales (i.e., Cronbach's α) was assessed using IBM SPSS Version 22. Consistency ratings were considered good at α >.80 and excellent at α > .90 (George & Mallery, 2003). Unless otherwise noted, significance was set to a two-tailed *p*-value of < .05.

Structural equation modeling: models tested and model fit.

Four models were assessed to determine whether event centrality was best understood as a "predictor" of PTSD, i.e., distinct from PTSD, or as a "reflector" of PTSD, i.e., a symptom of PTSD. The following models were examined:

Model 1: Correlated Variables Model. "Predictor" (Figure 1).

Model 2: Correlated Variables and Symptoms Model. "Predictor" (Figure 2).

Model 3: One Factor Model. "Reflector" (Figure 3).

Model 4: Higher Order Model. "Reflector" (Figure 4).

As each model tested included adjustments on the common set of parameters to be estimated, the models are considered nested (Steiger, Shapiro, & Browne, 1985) thus allowing for comparisons among models (i.e., does Model 2 have better fit than Model 1?). Comparison of the differing models was conducted using structural equation modeling (SEM) and the program LISREL 8.8 (Jöreskog & Sörbom, 2006). Maximum likelihood estimation method was used as it provides the most accurate fit indices and parameter estimates when compared to other estimation methods such as weighted least squares (WLS) and generalized least squares (GLS) (Olsson et al., 2010).

SEM model fit was determined by examining both absolute and incremental fit indices. Absolute fit indices determine fit by comparing the reproduced covariance matrix and the original covariance matrix, measuring exact residuals, and comparing the residuals to chance estimates (Barrett, 2007). Thus, absolute fit indices examine how well an *a priori* model established by the researcher fit the collected data. Fit for the first absolute fit index, minimum fit function chi-square (χ^2), was established using the associated significance test. However, the chi-square test is negatively biased toward both large samples and variables with high bivariate correlations (Bentler & Bonett, 1980; Chen, Sousa, & West, 2005), both of which are assumed in the current study. As such, critics vary on how stringent the chi-square and additional goodness of fit indices should be (Barrett, 2007; Hu & Bentler, 1999). Fit for the second absolute fit index, Root Mean Square Error of Approximation (RMSEA) was considered adequate fit at < .08 and good fit at < .05 (Browne & Cudeck, 1992). Incremental fit indices determine model fit by comparing the reproduced model to the independence (null) model and provides an index of degree of discrepancy between the two models while accounting for degrees of freedom (Barrett, 2007). Thus, incremental fit indices compare the model provided by the researcher to the "everything is independent model" (i.e., no correlation between measured variables). Fit for

both the incremental fit indices, Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI), was considered adequate at >.90 and above and good fit at >.95 (Browne & Cudeck, 1992).

As all four models tested were nested, comparison of fit indices between models was possible (e.g., does Model 2 fit better than Model 3?). Evaluation of the goodness of fit of one model over another model was established in several ways. Ideally, chi-square would be used to establish a significant change in model fit as it has a significance test based on change in degrees of freedom (Steiger, Shapiro, & Brown, 1985). However, chi-square is known to be affected by sample size (Chen, et al., 2005) and it can be overly sensitive to change when many constraints are place on a given model (Little, 1997). As such, changes in chi-square were interpreted with caution. Decreases in RMSEA, CFI, and NNFI of 0.01 or more were considered a significant change when comparing nested models (Chen, 2007). Finally, overall model parsimony will be considered. Model parsimony refers to models that have the highest number of degrees of freedom compared to the null or baseline model (McDonald & Marsh, 1990). Researchers consider model parsimony a reflection of good fit as the more relationships that are hypothesized (i.e., the more arrow/relationships that are drawn in SEM), the greater the likelihood that one is capitalizing on chance, over-fitting the data, or finding otherwise spurious results (Marsh, & Hau, 1996). Thus, a model that constrains the most parameters (i.e., estimates the fewest relationships) is seen as most parsimonious.

Factor loadings were examined for significance to ensure each item was loading on its respective latent variable. Squared multiple correlations (SMCs) for each item were also examined to determine the amount of variance in each latent variable associated with that particular item and is not due to measurement error (Jaccard & Wan, 1996) with SMCs >.30

considered good (Albright & Park, 2009). Similarly, SMCs for each of the latent variables were also examined as they represent the proportion of variance in the latent variable that can be accounted for using those particular individual items (Jaccard & Wan, 1996).

All LISREL syntax for Hypothesis 1 testing has been appended (Appendix N).

Event centrality as a symptom cluster: criterion validity.

In order to assess whether event centrality is associated with poor functioning, above and beyond traditional symptoms of PTSD, several hierarchal linear regressions and logistic regressions were conducted using SPSS Version 22.

Hierarchal linear regressions were used to examine the following continuous outcomes: post-displacement trauma, daily hassles since arrival to the U.S., social support, self-rated health, predicted self-rated health, chronic diseases, BMI, and sleep apnea. For these analyses, data were entered in three steps. For the first step control variables, specifically age, gender, and education, were entered. For the second step, PTSD symptom scores were entered. In the final step, event centrality (CES) was entered. Models were assessed for overall model fit, an increase in model fit when variables were entered at each step, and squared semi-partial correlations, which allow for examination of the proportion of variance predicted independently for each variable in the final model.

Logistic regression was used for the dichotomous outcome of a history of unemployment. For this analysis, age, gender, and education, PTSD symptom scores were entered, and, finally, event centrality scores (CES) were entered. This model was assessed for overall model fit at the final step (i.e., when CES scores were entered), odds ratios, and associated *p*-values.

Results

Hypothesis 1

Event centrality, as measured by the Centrality of Event Scale (Berntsen & Rubin, 2006), is a reflector, or symptom of PTSD, as opposed to a predictor of PTSD. Four models were examined to test this hypothesis. Specifically:

Model 1: Correlated Variables Model. "Predictor" (Figure 1).

Model 2: Correlated Variables and Symptoms Model. "Predictor" (Figure 2).

Model 3: One Factor Model. "Reflector" (Figure 3).

Model 4: Higher Order Model. "Reflector" (Figure 4).

Models 1 and 2 represent "Predictor" models where CES is distinct from PTSD symptoms. Models 2 and 3 represent "Reflector" models where CES is a symptom of PTSD. If, as previously suggested by researchers, CES predicts PTSD symptoms then Models 1 and 2 will demonstrate the best fit. If, however, as hypothesized in the current paper, CES is a symptom of PTSD then Models 3 and 4 will demonstrate better fit than Models 1 and 2.

Results indicate the overall model fit for all four models was below adequate (Table 17). However, Hu and Bentler (1995) emphasize the strength of model testing in SEM comes from both consideration of model fit indices and from comparison of models tested. As such, Hu and Bentler caution against focusing on the absolute cut-off values for fit indices (e.g., a CFI >.90) and instead consider how one model fits when compared to a competing model. Using this recommendation, examination of fit indices and changes in fit indices, Tables 17 and 18, respectively, indicate Models 2 and Model 4 both provide the best fit of the four models evaluated with these two models being statistically similar in their fit indices. With regards to model parsimony, Models 2 and 4 have the same degrees of freedom, however, Model 4 represents a common factor or higher-order model where one variable, namely PTSD, explains

the existence of the underlying symptoms. As such, Model 4 represents the most theoretically parsimonious model.

Examination of individual item factor loadings, presented in Table 19, indicate significant loadings for all indicators. Thus, each individual item, such as PCL 16, was significantly associated with its respective latent variable—either PTSD or hyper-arousal, depending on the model tested. Pathways between latent variables, such as the relationship between PTSD and re-experiencing in Model 4, were all also significant for each of the models tested (Table 20). Examination of squared multiple correlations (SMCs) for each of the individual items in Table 21 indicate the majority of the items had an adequate amount of variance being explained by the respective latent construct (i.e., >.30). Some items, however, such as PCL 11 and CES 2 had consistently low SMCs regardless of the model tested. Finally, SMCs for the latent constructs, reported in Table 22, indicate the items are accounting for an adequate amount of variance in Event Centrality and a high amount of variance in Hyper-arousal and Avoidance/Numbing. However, the SMC of 1.06 for Re-experiencing indicates a Heywood case where there is negative or near zero variance and suggests possible model misspecification (Heywood, 1931).

When combined, these results suggest that although none of the models tested had truly acceptable overall fit, the pattern of results indicate both Model 2 and Model 4 are the best fitting models for this sample. Between these two models, however, the overall fit indices are not statistically different and other aspects of model fit do not indicate notable differences between these two competing models. The only notable distinction between Models 2 and 4 is the parsimony of Model 4 where one common factor—PTSD—is seen as explaining or being statistically linked to each of the underlying symptoms, including: re-experiencing,

avoidance/numbing, hyper-arousal, and event centrality. A simplified depiction of Model 4 with the latent construct factor loadings has been provided in Figure 5.

Hypothesis 2

If event centrality is a symptom of PTSD, then high scores on the CES should be associated with poor global functioning thus demonstrating criterion validity for the CES as a reliable and valid measure of PTSD symptomology. In order to test this hypothesis, comparisons were made to determine whether those high in CES also report greater unemployment, post-displacement trauma, daily hassles, chronic diseases, BMI, and sleep apnea, as well as lower levels of social support, self-rated health, and predicted self-rated health. It was predicted those higher in event centrality would also report poor global functioning across this spectrum of variables listed above. It is important to note, these analyses included CES scores as the final step in the models after controlling for age, gender, education, and PTSD symptoms. Thus, any models where the CES is a significant predictor would indicate it represented unique variance above and beyond traditional PTSD symptoms (i.e., re-experiencing, avoidance/numbing, and hyper-arousal).

Results indicate high event centrality scores were associated with significantly worse self-rated health and predicted self-rated health. Additionally, marginal significance was found for the association between high event centrality scores and increased daily hassles and a greater number of chronic diseases. For the remaining four dependent variables no significant relationships for event centrality were found. For all comparisons made, high PTSD symptoms were significantly associated with poor global functioning. Table 23 details these results for the hierarchal linear regressions. In order to present the results as clearly and simply as possible, only results for the final step of the model, when CES was entered, have been presented.

Logistic regression was conducted to assess whether those with high CES scores were more likely to have a history of unemployment after arriving to the U.S., after statistically controlling for age, gender, education, and PTSD symptoms. Inclusion of CES scores in the final block did not significantly increase the prediction of classification, $\chi^2 = 0.04$, $df = 5$, $N = 280$, $p = .83$. Table 24 presents the odds ratios, which suggest that the odds of having a history of unemployment were not significantly higher for those with high CES scores. For clarity of presentation, only the final block, when CES was entered into the equation, has been listed in the table.

Given these results and the strict requirement that CES scores account for variance in the outcomes above and beyond established PTSD symptoms, follow-up analyses were conducted with the PCL removed. These results, presented in Table 25, indicate those with high CES scores report significantly higher post-displacement trauma exposure, a greater number of chronic diseases, more sleep apnea symptoms, and worse self-rated health and predicted self-rated health. For the remaining three variables, i.e., daily hassles, social support, and BMI, higher event centrality was not significantly associated with global functioning. As before, only the final step in the hierarchal regressions are presented.

Again, logistic regression results indicate those with high CES scores were no more likely to have a history of unemployment as inclusion of CES scores in the final block did not significantly increase the prediction of classification, $\chi^2 = 2.49$, $df = 4$, $N = 280$, $p = .12$. For these results, presented in Table 26, only values from the final model are presented (i.e., when CES was entered into the equation).

Data Screening Follow-Up

As detailed in Study 1 of the current paper, a notable portion of the participants in the study were "straight-line responders" where items within the CES were all given the same response (e.g., all "Totally Disagree" responses, all "Undecided" responses, etc.). As such, in the current study a new dummy variable was created using 2nd Follow-Up CES items where "straight-line responders" (n = 160; 56.94%) were compared to those who were considered "valid responders" (n = 121; 43.06%). Using this variable, straight-line responders were compared to valid responders to see if straight-line responders differed in the variables tested in the current study. Results, presented in Table 27, indicate straight-line responders differed on several variables of interest including exposure to pre-displacement trauma and measures of mental health, such as PTSD symptoms. Additionally, straight-line responders reported significantly lower CES scores ($M = 14.14$, $SD = 1.24$) than valid responders ($M = 21.39$, $SD = 4.38$; $F(1,279) = 397.76$, $p < .001$), indicating straight-line responders were much more likely to respond with all "Totally Disagree" or "Disagree" responses more than all symptomatic responses.

Given these differences, Hypothesis 2 analyses were re-ran using the 121 valid responders. Results indicate only one difference between the analyses with the valid responders (n = 121) and analyses including the entire sample (N = 281). Specifically, individuals who reported higher sleep apnea scores did not report significantly higher CES scores. No other new patterns for the CES emerged. Thus, although the straight-line responders do appear to differ from the valid responders on some variables, the overall trends and outcomes in the study do not change when the straight-line responders are removed.

Discussion

Results partially supported both Hypothesis 1 and Hypothesis 2. Specifically for Hypothesis 1, comparisons of competing models indicate Model 4, a "reflector" model, does not fit significantly worse than any of the other three models, including the two "predictor" models. Although not conclusive, this finding has implications for mental health screening in populations hesitant to disclose mental health concerns. Results for Hypothesis 2 also partially support criterion validity of CES as a measure of poor global functioning as high event centrality was associated with higher post-displacement trauma exposure, daily hassles, chronic diseases, sleep apnea symptoms, and worse self-rated health and predicted health. These results suggest event centrality is not merely an abstract, identity-focused construct, but a valid indicator that can account for poor global functioning in a high-risk population.

CES: Predictor vs. Reflector of PTSD

It was hypothesized Models 3 and 4 would fit better than both Models 1 and 2. However, results examining fit indices, factor loadings, and SMCs indicate Models 2 and 4 were not statistically dissimilar in fit. Neither model demonstrated good fit using the *a priori* established fit indices; yet, both models were close to the recommended cut-off values and each model demonstrated sound measurement fit as all items loaded on their respective latent constructs. Additionally, examination of the item SMCs indicate that although some of the items did not perform as well as expected, the majority of the individual items had SMCs above the recommended cut-off value. Similarly, the latent variable SCMs for Model 4 were also high. In sum, none of the models tested demonstrated good fit, but Models 2 and 4 were relatively better and indistinguishable from each other from a statistical point of view.

That Models 2 and 4 were "statistically tied" is theoretically noteworthy. With the exception of one study (i.e., Broadbridge, 2013), all previous event centrality and PTSD research

has assumed high event centrality scores *caused* high PTSD symptom scores. Yet, as discussed previously, this assumption is purely hypothetical and previous researchers had not examined another possibility—that event centrality is a symptom cluster of PTSD, much like re-experiencing or hyper-arousal. Broadbridge (2013) tested this theory by examining three competing models and found that a higher order model, Model 4 in the current study, was the most parsimonious model and was not statistically worse than the other models tested. Results from the current study extend these findings by comparing different models, specifically Models 1, 2, and 3 in the current study were not tested by Broadbridge, and by testing these new models in a highly-trauma exposed refugee population. Generally, however, results from the current study and Broadbridge are very similar; event centrality is not necessarily a cause of PTSD symptoms and there is statistical support for conceptualization of event centrality as a symptom cluster of PTSD.

Support for Model 4 has three important implications. First, with regards to theoretical understanding of event centrality, results from the current study and Broadbridge (2013) suggest event centrality is a reflection of PTSD and, as such, may be properly regarded as a PTSD symptom cluster. This finding would help explain why previous event centrality researchers were finding very high correlations between CES and PTSD symptoms. High event centrality was not causing PTSD symptoms but reflects a cognitive aspect of PTSD. Instead of invalidating previous event centrality and PTSD research, these findings should be seen as reinforcing the importance of memory, identity, and rumination in PTSD.

Second, event centrality is not a symptom cluster of PTSD in the current *DSM* (5th ed., *DSM-5,* American Psychiatric Association, 2013); yet, results from the current study and Broadbridge (2013) suggest the *DSM* may be missing event centrality as a critical symptom

cluster. Suggesting a new symptom cluster for PTSD diagnosis is, no doubt, ambitious given that previous reviews of PTSD symptomology have gone unaddressed (e.g., Rosen & Lilenfeld, 2008). Nevertheless, results from this study as well as Broadbridge's results indicate including event centrality as a PTSD symptom cluster is statistically viable.

Third, use of event centrality as a symptom cluster of PTSD may open up opportunities for measuring mental health in populations where poor mental health is highly stigmatized. As discussed previously, individuals from Middle Eastern backgrounds frequently underreport mental health symptoms (Barkho et al., 2011; Erickson & Al-Timmi, 2001) and face not only larger cultural stigma about their own poor mental health (Ciftci et al., 2012; Kulwicki, 2002) but also may cause problems for their family if they admit to mental health problems (Youssef & Deane, 2006). These cultural barriers to admitting to distress may be relatively impenetrable and have been found in other immigrant groups, such as Asian Americans (Abe-Kim et al., 2007). However, results from the current study suggest use of the CES may be a means of assessing mental health in populations leery of discussing symptoms such as nightmares, avoidance of specific places, or fear of the future. Use of the CES as a proxy for the entirety of PTSD symptoms is probably not ideal for most populations. However, for the current study of Iraqi refugees, who report very low PTSD symptoms, the CES's assessment of the cognitive and identity-focused aspects of PTSD offers an opportunity to assess poor mental health with less potential for underreporting due to cultural stigma.

CES: Criterion Validity of Poor Global Functioning

Consideration of event centrality as a symptom cluster of PTSD would require that high CES scores are related to poor global functioning. Results from the current study partially

support this criterion validity approach with six of the nine outcomes demonstrating that high event centrality is associated with worse overall health.

Hypothesis 2 proposed CES scores must out perform PCL scores and predict *more* variance in the outcome variables than PTSD symptoms. This hypothesis was ambitious and only partially supported. High CES scores predicted variance above and beyond PTSD for worse self-rated health and predicted self-rated health with marginal significance for high CES scores and a greater number daily hassles and chronic diseases. To date, these are the first results specifically confirming high CES scores are associated with worse global functioning even when PTSD symptoms are included in the model. These results are consistent with prior research linking high PTSD with daily hassles (Brewin et al., 2000; Miller & Rasmussen, 2010; Possemato et al., 2014), poor subjective health (Barrett et al., 2002; Hoge et al., 2007; Schnurr & Spiro, 1999), and a greater number of chronic diseases (Barrett et al., 2002; Boscarino, 2006). However, results from the current study extend this research by suggesting event centrality is not only a symptom cluster of PTSD but an important symptom cluster as CES scores were significant or marginally significant for four of the nine global functioning variables evaluated.

Removal of PTSD symptoms from the analyses was conducted to examine whether high event centrality was associated with poor global functioning, regardless of PTSD symptoms. Results again suggested those high in event centrality are more likely to experience problems in mental and physical health. Specifically, two new relationships emerged indicating those higher in event centrality reported higher post-displacement trauma and increased sleep apnea symptoms. When combined with the above results, these data indicate high event centrality is associated with poor global functioning for six of the nine outcomes evaluated.

Of note are the consistent non-significant relationships between high event centrality and BMI, social support, and unemployment. One possibility is that the relationships between high event centrality, BMI, social support, and unemployment may simply take longer to develop. These refugees have only been in the U.S. for two years when these measurements were taken. Previous research examining PTSD and BMI, social support, and unemployment have found longitudinal relationships that took many years to develop (Kubzansky et al., 2014; Possemato et al., 2014; respectively). Thus, it may be that these refugees would demonstrate a relationship between high event centrality and high BMI, low social support, and unemployment if they were assessed in ten years. However, examination of Table 19 indicates increased PTSD symptoms are associated with a higher BMI and lower social support even though event centrality is not associated with these outcomes. Thus, it may simply be that the proposed PTSD symptom cluster of event centrality is associated with many aspects of poor global functioning but this does not include BMI, social support, or unemployment.

Limitations and Future Directions

Straight-line responses for approximately 57% of the 2nd Follow-Up CES scores are a notable limitation. Although results remained relatively unchanged when straight-line responders were removed, this type of responding raises serious methodological concerns. As discussed in Study 1 of the current paper, this type of responding also creates difficulty when estimating SEM models as the sample size becomes untenable for SEM once the straight-line responders are removed. The current study benefited from the use of many measures of global functioning, such as chronic diseases and daily hassles. However, the inclusion of these measures of global functioning greatly increased the survey length, which may have created the straight-line

response pattern. As such, future researchers should be aware of the trade-off between inclusion of many variables of interest and declining quality of data (e.g., Rathod & LaBruna, 2005).

Additionally, future research should be cognizant that the strength of using SEM lies in the number of competing models tested. In the current study four models were examined. There are, however, several other models that could have been tested. Specifically, three of the models tested by Broadbridge (2013) are distinct from models tested in the current study as Broadbridge separated the Avoidance/Numbing cluster into two clusters, Avoidance and Numbing, respectively. Follow-up work in this area should compare the models proposed by Broadbridge, the models proposed in the current study, and additional theoretical models to understand event centrality's relationship to PTSD symptom clusters.

For two-thirds of the outcomes evaluated for criterion validity, high event centrality was at least marginally associated with poor global functioning. However, no relationships were found for high event centrality and BMI, social support, or unemployment. These findings merit further consideration as prior research has linked PTSD symptoms with poor functioning across these variables. As such, future event centrality research should consider the relationships between high event centrality and poor global functioning in other populations other than Iraqi refugees, such as veterans or college students.

Finally, all items in the current study were self-reported with many items being dichotomous. This study is notable in that it is the first study to specifically examine criterion validity of the CES using physical health and global functioning; however, some of the measures used could have been externally validated or measured with more precision. For example, self-reported chronic diseases could have been confirmed using medical records. Similarly, the severity of any diseases was impossible to evaluate in the current data set. Thus, an individual

with controlled Type II diabetes would have received the same chronic diseases score as an individual who is non-compliant and hospitalized frequently. Although it is difficult to attain externally validated and precise data, this type of data would do much to move the event centrality and PTSD fields forward.

CHAPTER 5

General Discussion

When combined, the studies presented in the current paper suggest event centrality, as measured by the CES, is not only an abstract, identity focused construct but may be a valid measure of PTSD symptoms. Specifically, as described in Study 1, the CES is internally consistent and likely stable over time. Second, the CES is affected by both cumulative trauma exposure and specific traumatic events, following a pattern similar to PTSD symptoms. And, finally, the CES has statistical support as a possible symptom cluster of PTSD with those reporting high event centrality scores also reporting poor global functioning across multiple variables. Although several of the outcomes could be more conclusive, such as fit indices for Studies 1 and 3, the preponderance of the data presented in the current paper suggest a similar trend—namely that the CES should be considered as a cognitive symptom cluster for PTSD. The implications of these findings, areas for further research, and theoretical questions are considered below.

What, exactly, is the CES measuring?

Results from the current paper are in line with previous research by Berntsen and Rubin (2006) and other event centrality studies (e.g., Barton, Boals, & Knowles, 2013; Boelen, 2012; Rubin, Boals, & Hoyle, 2014) that suggest the CES is psychometrically sound. Additionally, Studies 1 and 3 from the current paper and work by Broadbridge (2013) suggest the 7-item CES can be conceptualized as a single factor with all items assessing the same latent variable. One should be careful, however, not to fall into the nomological fallacy where the naming of a construct leads the researcher to feel he or she is actually measuring that construct (Harlow, 2014). The CES was designed to measure the consequentiality of a traumatic event and the

integration of that traumatic event into one's identity (Berntsen & Rubin, 2006). Results from this paper and others suggest the CES is consistently and reliably measuring something; however, it is possible the CES is not measuring event centrality but measuring a pattern of cognitive aspects of PTSD symptoms. It is possible event centrality has been an unidentified symptom of PTSD and the conceptualization of the CES as a "predictor" of PTSD has prevented researchers from identifying event centrality as a symptom cluster. For example, McNally and colleagues (1995) found veterans with PTSD who wore war regalia (e.g., medals, hats, etc. with military affiliation) demonstrated a specific pattern of cognitive symptoms including identifying strongly with their past military service and being cognitively "stuck in past." Researchers looking to verify their assumption that event centrality leads to PTSD symptoms may have read the research by McNally and colleagues and suggested that centralizing a traumatic event through wearing war regalia and other behaviors was what caused the resulting PTSD symptoms. Alternatively, however, results from the current paper and Broadbridge (2013) suggest it may be that PTSD has certain cognitive aspects including difficulty with autobiographical memory, identity, and over-centralization of a traumatic event. To date, results are not conclusive for either proposed model. However, results from the current study would suggest both models should at least be considered in future research.

Ultimately, one could argue that the name of the construct is irrelevant so long as the scale consistently performs as expected and is linked to real-world outcomes, such as poor global functioning. Yet, as results from the current study and Broadbridge (2013) indicate names and labels do matter. Results from the current paper reinforce two aspects of construct and scale development. First, a scale, such as the CES, is an imperfect measure of a construct and identification and labeling of a construct does not guarantee measurement of that construct. The

CES is an approximation used to measure a pattern of responses that researchers agree upon is referred to as event centrality. Yet, this measure is imperfect and measurement using a different method may yield a different understanding of event centrality. Second, naming a construct and identifying it as a "predictor" or antecedent to other outcomes may result in assumptions that often go unnoticed in research. Prior event centrality researchers have asked research questions with the *a priori* understanding that event centrality caused high PTSD symptoms. Future event centrality researchers should be cognizant of how this assumption may affect their hypothesis development.

With regards to the CES scale, future research should take language of the items and item wording into consideration. All items in the CES are coded in the same direction with higher scores reflecting higher event centrality. The longer 20-item version of the CES (Berntsen & Rubin, 2006) also follows this same pattern. Future work examining temporal stability of the CES should consider some items that require reverse coding. For example, CES item 5 could be changed from "This event has permanently changed my life" to "This event has *not* permanently changed my life" (italics added here for emphasis). Similarly, Broadbridge (2013) asked participants to respond to a positively valenced CES item, "This event was a turning point in my life for the better". The use of several reverse coded items would serve to help screen out straight-line responders and also provide an opportunity to assess the positive aspects of event centrality (discussed below).

Single Traumas, Multiple Traumas, and Event Centrality

Findings from the current studies highlight a larger issue in PTSD and event centrality research—namely the simultaneous acknowledgement and dismissal of the effect of cumulative trauma exposure. As mentioned previously, research has consistently demonstrated increasing

trauma exposure is associated with increasing PTSD symptoms. This trend has been found in U.S. soldiers (Clancy et al., 2006; Foy et al., 1984), refugees (Arnetz et al., 2014; Mollica, McInnes, Poole, & Tor, 1998) adults who experienced trauma as children (Cloitre et al., 2009), and a representative sample of adults from the U.S. (Breslau et al., 1999). Researchers have referred to this pattern as the "dose-effect" or "dose-response" relationship between trauma exposure and PTSD symptoms (March, 1993; Mollica, McInnes, Poole, & Tor, 1998; Pynoos et al., 1993). Yet, the current *DSM-5* criteria make no mention of the effect of cumulative trauma when diagnosing PTSD or understanding PTSD symptoms. Similarly, prior event centrality research has focused on one's *most* stressful or traumatic memory. The implied understanding for both PTSD diagnostic criteria and event centrality research is the assumption is that there is no additive or interactive effect of trauma across the lifespan. The purpose of the current study is not to re-write the *DSM-5* diagnostic criteria for PTSD, thus the debate as to whether PTSD diagnosis should consider multiple traumas is beyond the scope of this study (for relevant reviews refer to Van der Kolk (2000) and Zoladz & Diamond (2013)). However, results from the current study suggest the impact of cumulative trauma exposure on event centrality should be revisited. The current theoretical understanding of event centrality is not wholly incorrect as the impact of one specific event may heavily influence event centrality. Yet, results from Study 2 suggest cumulative trauma exposure is linked to event centrality with those experiencing the highest cumulative trauma reporting the highest event centrality regardless of the specific details of the *most* traumatic event.

However, a larger question remains regarding trauma exposure and event centrality. How does one de-couple the two? One cannot meaningfully respond to items on the CES without experiencing the traumatic or stressful event. So, how does event centrality begin? Or,

what conditions create a favorable environment for the emergence of event centrality? This question has remained largely unaddressed in previous studies. Some researchers have suggested that certain personality traits, such as neuroticism, are linked to higher event centrality scores (Barton, Boals, & Knowles, 2013; Boelen, 2009; Rubin, Boals, & Hoyle, 2014). However, it may be that neuroticism and event centrality are mediated through ruminative processes (Newby & Moulds, 2011). Thus personality traits, such as neuroticism, may be causing later event centrality but only if the individual is focusing on negative rumination. For example, a person who is high on neuroticism may view a traumatic event as "something bad that happened to me because bad things always happen to me" then this negative rumination and excessive cognitive focus on the trauma may result in the event becoming highly centralized. Yet this suggestion has been examined only cross-sectionally so it is unclear whether someone with a high neuroticism score at Time 1 would experience a trauma, report high negative rumination for the event, and then report a high CES score at Time 2 (i.e., does neuroticism come first?). If, as suggested by the current paper, event centrality is a PTSD symptom cluster, then it may be impossible to assess trauma, event centrality, and PTSD independently. Nevertheless, the inability to prospectively examine event centrality does merit further attention by researchers.

CES vs. PCL

If the CES is a valid symptom cluster of PTSD, and assessment of event centrality is simply measuring another set of PTSD symptoms, why use the CES at all? Using the PCL to assess PTSD symptoms has been validated (Blanchard et al., 1996; Ruggiero et al., 2003), so why would one need to use the CES in addition to the PCL? We suggest two possible responses.

First, the CES can be used in addition to the PCL or as a substitute for the PCL. Future researchers should administer both the CES and the PCL in order to better understand how the two measures function in different populations, across different trauma exposures, at different points in the lifespan, or how the measures change over time. Results from the current study and from Broadbridge (2013) are not conclusive and future event centrality research should continue examining *both* the CES and the PCL. Yet, results from the current study do suggest that when both measures cannot be given, for example due to time constraints or due to cultural stigma surrounding mental health, the CES may be a valid measure of poor mental health. As discussed previously, certain cultural groups such as refugees from the Middle East or Asian Americans are quite reluctant to disclose mental health problems or seek treatment for poor mental health (Barkho et al., 2011; Abe-Kim et al., 2007). The CES may be a valid alternative to the PCL in these cultural groups. The CES does not assess all of the symptom clusters of PTSD (e.g., hyper-arousal) so is an imperfect measure of the spectrum of PTSD symptoms. However, individuals from certain cultural groups may be more likely to truthfully respond to questions on the CES when compared to questions on the PCL as CES items do not overtly or obviously assess mental health. Clearly more research is merited in this area; however, results from the current study suggest the CES may be a valid alternative to more traditional measures of poor mental health, especially in certain cultural groups.

Second, using the CES may offer a complementary understanding of how participants view their poor mental health. Specifically, for both the CES and the PCL participants are asked to reference a specific stressful or traumatic event and respond to scale items with this memory in mind. These instructions may be requesting a lot for some participants. For example, PCL item 6 asks individuals to consider whether they "avoid thinking about or talking about [the]

stressful experience from the past or avoided having feelings related to it". This question is complicated by very the nature of the symptom it is addressing. If one is trying to avoid recalling an event and avoid emotions related to this event, can we expect that person to truthfully "go back" to the event and describe their physical and emotional reactions? Relatedly, questions like this and other PCL questions addressing concerns such as disturbed sleep (PCL item 13) require a introspection and a linking of events that may seem unrelated to the participant. This is not to say participants cannot perform this task or that the PCL is invalid, as previous research has established the PCL and PTSD symptoms addressed in the *DSM* can identify those with poor mental health (e.g., Blanchard et al., 1996). However, use of the CES may provide a different mechanism for the participant to consider how an event has affected his or her behavior, cognitions, and emotions. In many ways the CES is somewhat vague and amorphous and only when you consider the CES in light of a traumatic event do these items become useful questions. Yet, these more open-ended questions (e.g., This event was a turning point in my life.; CES item 7), may offer an opportunity for the individual to consider the event from the present instead of in the past. Consideration of the event from the safety of the "here and now" may allow for honest or reflective responses. When an individual is asked to respond to "This event was a turning point in my life," he or she can respond without thinking, "If I say 'yes' that means I have some sort of problem." In addition, the lack of specific symptoms in the CES does not require participants to link an event and symptoms that may seem quite separate. As such, event centrality may be an unusual but powerful measure of mental health. Use of the CES in conjunction with traditional measures of PTSD, such as the PCL, may offer researchers and clinicians a more thorough understanding of how PTSD symptoms are best conceptualized and measured.

What Comes After Event Centrality?

The current paper has assumed event centrality is always a negative experience. However, as hypothesized by Broadbridge (2013) and others (e.g., Boals & Schuettler, 2011), event centrality may be positive with the individual viewing the experience as a turning point in his or her life for the better. Other researchers have referred to this as posttraumatic growth (Tedeschi & Calhoun, 1996). Previous research indicates individuals who exhibit posttraumatic growth or a "turning point in my life for the better" mentality are the least likely to have enduring distress after a traumatic event (Frazier, Conlon, & Glaser, 2001). However, research also suggests individuals who report high levels of posttraumatic growth also frequently report both high event centrality scores and high PTSD scores (Boals & Schuettler, 2011). If posttraumatic growth / positive event centrality was the outcome of healthy cognitive processing of the trauma then one would expect declining PTSD symptoms for individuals who report high posttraumatic growth; instead, research suggests the opposite. Research in this area is further complicated by findings that propose posttraumatic growth may only reflect a belief that one has positively changed instead of measurable changes in mental health and psychological well-being (e.g., Frazier et al., 2009). The current paper remains relatively silent on positive event centrality and posttraumatic growth as the focus of the three studies was to examine the stability and validity of the CES as a measure of PTSD symptoms. Nevertheless, future researchers should explore how positive and negative event centrality interact over time, especially in a group such as refugees where life circumstances and narrative identity may be subject to frequent changes.

To date, there are no studies explicitly addressing whether a decline in event centrality, specifically negative event centrality, leads a subsequent decline in PTSD symptoms. A study of this nature would, of course, do much to aid in the understanding of the cause and effect

relationship between PTSD and event centrality. However, related research does exist. Clinical researchers have demonstrated narrative exposure therapy (NET), where the individual talks about the traumatic experience with the purpose of integrating the trauma into his or her larger life story, can decrease poor mental health symptoms. For example, Hijazi and colleagues (2014) examined whether brief NET could reduce PTSD symptoms and increase posttraumatic growth in trauma exposed Iraqi refugees. Results indicate refugees who completed the brief NET intervention reported significantly lower PTSD symptoms at the 2-month follow-up and also reported significantly higher posttraumatic growth and well-being at the 4-month follow-up. It is possible that Hijazi and colleagues (2014) and other NET researchers (e.g., Neuner, Schauer, Klaschik, Karunakara, & Elbert, 2004) are helping shift participants' negative event centrality symptoms into focusing more on posttraumatic growth which then decreases PTSD symptoms. The timing, however, and causal nature of these relationships is not clear.

Event Centrality: Expanding Our Understanding of Cognition

The current paper adds to the growing body of literature suggesting memories of traumatic events are no more likely to be fragmented or difficult to recall than memories of other events (e.g., Boals & Schuettler, 2011; Rubin et al., 2011). This research is in line with the work of Rubin and colleagues (2008) who have suggested no special mechanisms are necessary to understand stressful or traumatic memories. Instead, traumatic memories are over-integrated into the autobiographical memory system and symptoms of poor mental health after trauma are associated with this over-integration. That research supports this basic model or autobiographical memory model of traumatic memories is notable as it represents as shift from decades of research suggesting different memory mechanisms or processes for many different kinds of memories (e.g., Brown and Kulik's "Now print!" mechanism for flashbulb memories;

1977). Instead, this paper and other research suggest parsimony may be favored in cognition with few or no special mechanisms necessary to understand memories that seem phenomenal. Memory "extremes", such as traumatic memories that are vivid and intrusive, likely represent an exaggeration of normal cognitive processes. As such, researchers examining memories for traumatic events should not just consider how stressful memories are different from other types of "normal" memories (e.g., everyday memories, positive memories, etc.), but also how these memory types are all driven by the same processes (Rubin, 2006, 2011).

Ultimately, this paper and other research examining event centrality, trauma, and PTSD suggest that it is the memory of the event, not the actual event that is responsible for poor mental health following trauma. As discussed previously, the subjective evaluation the traumatic event (i.e., how the person recalls the traumatic event) is a better predictor for poor mental health following trauma than an outsider's objective assessment of the trauma (i.e., how traumatic others believe the event to be) (Boals & Schuettler, 2011).   Other research suggests changing the memory of the traumatic event can decrease poor mental health and improve well-being (Hijazi et al., 2014). Research examining episodic and autobiographical memory support the view that memory is a reconstructive process (Conway & Pleydell-Pearce, 2000) and that how one views identity and the past "self" is subject to change over time (McAdams et al., 2006). When combined, these studies suggest that although one cannot change the traumatic event that occurred, it is possible to change or re-frame the memory for that traumatic event. Memory and identity are interdependent and malleable. As such, a complete understanding of mental health after trauma requires a cognitive component with a specific emphasis on how identity is associated with that traumatic memory. Future research examining mental health after trauma should continue to study this intersection of memory and mental health. A more complete

understanding of this relationship would aid clinicians, researchers, and, of course, the

individuals, such as the refugees in the current study, who experienced the traumatic event.

Table 1. *Demographics and Sample Attrition Over Time*

Sociodemographic Variables	Baseline (n=298)	1st Follow-up (n=291)	2nd Follow-up (n=286)
	n (%)	n (%)	n (%)
Gender			
Female	137 (46)	133 (45.7)	130 (45.45)
Male	161 (54)	158 (54.3)	155 (54.55)
Marital Status			
Married	154 (51.7)	155 (52.0)	160 (53.7)
Not married	144 (48.3)	136 (45.6)	126 (44.06)
Current Living Situation			
Live with core family	201 (67.4)	257 (86.2)	242 (81.2)
Live alone or with strangers	97 (32.6)	33 (11.1)	33 (11.5)
Education			
High School or Less	213 (71.5)	202 (69.4)	203 (68.1)
Greater than High School	85 (28.5)	89 (30.6)	83 (27.9)
Religious Affiliation			
Christian	269 (90.3)		
Muslim	25 (8.4)		

Mandia	4 (1.3)		
Employment Status			
Employed	5 (1.7)	144 (48.3)	163 (54.7)
Unemployed	293 (98.3)	147 (49.3)	117 (39.3)

	M (SD)	M (SD)	M (SD)
Age (years)	33.41 (11.29)	34.30 (11.37)	35.42 (11.28)
Number of children	1.38 (1.79)	1.42 (1.67)	1.49 (1.72)
Number of children <18 yrs	.91 (1.21)	.97 (1.22)	.89 (1.18)
Time in transition (months)	28.57 (27.82)	na	na
Time in the U.S. (months)	1.00 (1.08)	12.51 (1.13)	24.81 (1.54)

[a] Repeated measures analysis of variance (ANOVA)

Table 2. *Centrality of Event Scale (CES) Over Time (N = 281)*

	1st Follow-up	2st Follow-up	
	M (SD)	M (SD)	*p* [a]
I feel this event has become part of my identity. [b]	2.32 (.81)	2.24 (.70)	.03
This event has become a reference point for the way I understand myself and the world.	2.12 (.49)	2.06 (.37)	.04
I feel that this event has become a central part of my life story.	2.47 (.96)	2.46 (.90)	.86
I feel that this event has influenced the way I think and feel about other experiences.	2.56 (.94)	2.53 (.92)	.66
This event has permanently changed my life.	2.64 (1.00)	2.70 (.97)	.26
I often think about the effects this event will have on my future.	2.54 (.93)	2.43 (.84)	.02
This event was a turning point in my life.	2.72 (1.00)	2.83 (1.03)	.01
	M (SD)	M (SD)	*p* [c]
CES Sum Score [d]	17.38 (5.22)	17.26 (4.72)	.01
CES Sum Score Valid Responders Only [e]	22.84 (4.50)	22.10 (4.30)	.02

Note. Seven missing responses (0.36%) for 2nd Follow-up were estimated using multiple imputation in SPSS.
[a] Repeated measures analysis of variance (ANOVA)
[b] CES items scores such that higher scores indicate greater event centralization.
[c] Paired samples t-test.
[d] Calculated by summing the seven event centralization items within each time point. Scores could range from 7 to 35. Includes all participants.
[e] Includes only participants who were not straight-line responders at either time point (n = 94).

Table 3. *Harvard Trauma Questionnaire for Pre-Displacement Trauma with Specific Trauma Sub-Types Indicated (N = 281)*

Traumatic event	n (%)
Personal Trauma to Self	
Physically harmed (beaten, knifed, etc.)	47 (15.8)
Kidnapped	29 (9.7)
Taken as hostage	22 (7.4)
Physical Trauma to Others	
Witnessed someone being physically harmed (beating, knifing, etc.)	93 (31.2)
Witnessed murder	69 (23.2)
Witnessed execution of civilians	40 (13.4)
Witnessed rotting corpses	153 (51.3)
Searched arbitrarily	86 (28.9)
Witnessed shelling, burning, or razing of residential areas or marshlands	252 (84.6)
Present while someone searched for people or things in your home	97 (32.6)
Lack of Necessities	
Suffered from lack of food or clean water	50 (16.8)
Suffered ill health without access to medical care or medicine	55 (18.5)
Lacked shelter	17 (5.7)
Abduction of Family Member or Friend	
Family member (child, spouse, etc.) or friend taken as hostage	161 (54.0)
Kidnapping of family member (child, spouse, etc.) or friend.	169 (56.7)
Disappearance of family member (child, spouse, etc.) or friend	90 (30.2)

Murder or violent death of family member (child, spouse, etc.) or friend	169 (56.7)

Persecution / Coercion

Forced to flee your country or place of settlement	269 (90.3)
Forced to settle in a different part of the country with minimal services	241 (80.9)
Oppressed because of ethnicity, religion, or sect.	270 (90.6)
Someone informed on your placing you and your family at risk of injury or death	121 (40.6)
Witnessed desecration /destruction of religious shrines or places of religious instruction	195 (65.4)

Other Trauma Types

Confined to home because of chaos and violence outside	290 (97.3)
Witnessed or heard combat situation (explosions, artillery fire, shelling) or landmine	289 (97.0)
Property looted, confiscated, or destroyed	115 (38.6)
Witnessed the arrest, torture, or execution of religious leaders or important members of tribe	12 (4.0)
Serious physical injury from combat situation or landmine	11 (3.7)
Imprisoned arbitrarily	9 (3.0)
Witnessed torture	8 (2.7)
Expelled from your country based on ancestral origin, religion, or sect	4 (1.3)
Forced to inform on someone placing them at risk of injury of death	2 (0.7)
Forced to destroy someone's property	2 (0.7)
Forced to physically harm someone	2 (0.7)

Received the body of a family member and prohibited from mourning them and performing burial rites	2 (0.7)
Witnessed sexual abuse or rape	0 (0.0)
Forced to pay for bullet used to kill family member	0 (0.0)
Sexually abused or raped	0 (0.0)
Coerced to have sex for survival	0 (0.0)

	M (SD)
Cumulative Pre-Displacement Trauma [a]	12.51 (3.44)

[a] Calculated by summing all pre-displacement trauma exposure. Scores could range from 0 to 39.

Table 4. *Posttraumatic Stress Disorder Checklist--Civilian Version Over Time (N = 281)*

	Baseline	1st Follow-up	2nd Follow-up	
	M (SD)	M (SD)	M (SD)	p [a]
Repeated memories or thoughts [b]	1.43 (.74)	1.63 (.82)	1.69 (.78)	<.001
Disturbing dreams	1.16 (.52)	1.12 (.42)	1.11 (.41)	.13
Acting or feeling as if re-experiencing	1.07 (.38)	1.08 (.34)	1.09 (.33)	.82
Feeling upset when reminded	1.17 (.51)	1.23 (.62)	1.30 (.59)	.004
Physical reactions	1.10 (.43)	1.07 (.30)	1.09 (.34)	.52
Avoid thinking or talking	1.11 (.49)	1.14 (.51)	1.19 (.50)	.08
Avoid activities or situations	1.05 (.42)	1.08 (.39)	1.06 (.28)	.45
Trouble remembering event	1.03 (.25)	1.01 (.15)	1.03 (.21)	.46
Loss of interest	1.12 (.44)	1.13 (.52)	1.25 (.61)	<.001
Feeling distant	1.06 (.36)	1.04 (.28)	1.11 (.39)	.03
Feeing numb	1.02 (.17)	1.02 (.16)	1.03 (.18)	.85
Feeling future cut short	1.08 (.38)	1.05 (.31)	1.10 (.38)	.28
Trouble sleeping	1.33 (.80)	1.31 (.76)	1.47 (.87)	.01
Feeling irritable	1.32 (.62)	1.22 (.57)	1.65 (.76)	<.001
Having difficulty concentrating	1.21 (.56)	1.23 (.57)	1.47 (.73)	<.001
Being alert or on guard	1.11 (.42)	1.10 (.39)	1.15 (.46)	.24
Feeling jumpy	1.20 (.54)	1.12 (.38)	1.25 (.60)	.005
	M (SD)	M (SD)	M (SD)	
PCL Sum Score [c]	19.50 (5.52)	19.54 (5.78)	21.03 (5.46)	.05

[a] Repeated measures analysis of variance (ANOVA)
[b] Scores coded such that higher scores reflect greater symptom presence.

[c] Calculated by summing all 17 PCL items within each time point. Scores could range from 17 to 85.

Table 5. *Post-Displacement Trauma (U.S. Trauma Questionnaire) Over Time (N = 281)*

	Baseline	1st Follow-up	2nd Follow-up
	n (%)	n (%)	n (%)
Oppressed because of ethnicity, sect, etc.	0 (0)	2 (.70)	5 (1.7)
Present while property searched	0 (0)	0 (0)	0 (0)
Searched arbitrarily	0 (0)	0 (0)	1 (.30)
Property looted, confiscated, etc.	0 (0)	2 (.70)	13 (4.4)
Forced to settle with minimal services	0 (0)	1 (.30)	0 (0)
Imprisoned arbitrarily	0 (0)	1 (.30)	0 (0)
Suffered ill health without medical care	0 (0)	1 (.30)	54 (18.1)
Suffered from lack of food and water	0 (0)	0 (0)	0 (0)
Forced to flee country	0 (0)		
Expelled from country	0 (0)		
Lacked shelter	0 (0)	0 (0)	0 (0)
Witnessed desecration of religious shrines	0 (0)		
Witnessed arrest of religious leaders	0 (0)		
Witnessed execution of civilians	0 (0)		
Witnessed shelling, burning, etc.	0 (0)		
Witnessed or heard combat situation	0 (0)		
Serious injury from combat or landmine	0 (0)		
Witnessed rotting corpses	0 (0)		
Confined to home because of violence	0 (0)	0 (0)	0 (0)
Witnessed someone being harmed	0 (0)	1 (.30)	0 (0)

Witnessed sexual abuse or rape	0 (0)	0 (0)	0 (0)
Witnessed torture	0 (0)		
Witnessed murder	0 (0)	0 (0)	0 (0)
Forced to inform on someone	0 (0)		
Forced to destroy someone's property	0 (0)		
Forced to physically harm someone	0 (0)		
Murder or violent death of family member	1 (.30)	1 (.30)	1 (.30)
Forced to pay for bullets	0 (0)		
Received body of family member	0 (0)		
Disappearance of family member	0 (0)	0 (0)	0 (0)
Kidnapping of family member	0 (0)	0 (0)	0 (0)
Family member taken as hostage	0 (0)	0 (0)	0 (0)
Someone informed on you	0 (0)	0 (0)	0 (0)
Physically harmed	0 (0)	1 (.30)	0 (0)
Kidnapped	0 (0)	0 (0)	0 (0)
Taken as hostage	0 (0)		
Heard about frightening or dangerous events	1 (.30)	0 (0)	0 (0)
Sexually abused or raped	0 (0)		
Coerced to have sex for survival	0 (0)		
Seen person in U.S. who was violent		0 (0)	2 (.70)
Family with mental health problems		25 (8.4)	52 (17.4)
Family with health problems		106 (35.6)	134 (45.0)
Family with legal troubles		2 (.70)	4 (1.3)

Evicted or foreclosed on	1 (.30)	4 (1.3)
Utilities turned off	2 (.70)	6 (2.0)
Stress related to financial situation	236 (79.2)	211 (70.8)
Worry about being deported	9 (3.0)	4 (1.30)
Harassed by police	4 (1.3)	3 (1.0)
Car accident	15 (5.0)	35 (11.70)
Been imprisoned	0 (0)	2 (.70)
Been arrested	1 (.30)	2 (.70)
Coerced to do an illegal action for money	0 (0)	0 (0)
Approached to do an illegal action for money	0 (0)	0 (0)
Sexually harassed	1 (.30)	0 (0)
Serious personal injury from assault	0 (0)	0 (0)
Injured in another type of accident		19 (6.4)
Core family unable to move to U. S.		135 (45.3)

	M (SD)
Cumulative Post-Displacement Trauma [a]	3.85 (2.01)

[a] Calculated by summing all post-displacement trauma exposures. Scores could range from 0 to 115.

Table 6. *Daily Hassles Over Time (N = 281)*

	Baseline	1st Follow-up	2nd Follow-up
	n (%)	n (%)	n (%)
Problems with your spouse [b]	1 (.40)	3 (1.1)	10 (3.6)
Daily money problems	272 (96.8)	236 (84.0)	204 (72.6)
Problems with your children	4 (1.4)	3 (1.1)	8 (2.8)
Problems with your parents	1 (.40)	2 (.70)	3 (1.1)
Problems with other relatives	3 (1.1)	7 (2.5)	3 (1.1)
Problems with safety	2 (.70)	1.17 (.51)	38 (13.5)
Problems with transportation	268 (95.4)	14 (5.0)	84 (29.9)
Problems with language	269 (95.7)	136 (48.4)	226 (80.4)
Problems finding a job	260 (92.5)	252 (89.7)	55 (19.6)
Problems at work	2 (.70)	108 (38.4)	25 (8.9)
	M (SD)		
Cumulative Hassles	8.96 (2.22)		

[a] Items coded such that 0 = "Never/Hassle Does Not Apply/Low Hassles" and 1 = "Hassles Present/High Hassles".
[b] Calculated by summing hassles across the three measurement waves. Scores could range from 0 to 30.

Table 7. *Social Support Over Time (N = 281)*

	Baseline	1st Follow-up	2nd Follow-up	
	M (SD)	M (SD)	M (SD)	*p* [a]
When lonely, people to talk to [b]	4.03 (.53)	3.77 (.73)	3.89 (.76)	<.001
No one to talk to about problems	3.96 (.55)	4.00 (.49)	3.98 (.67)	.74
Often meet/talk with family/friends	3.85 (.70)	3.58 (.86)	3.66 (.87)	<.001
Several people to spend time with	3.85 (.64)	3.75 (.74)	3.83 (.71)	.19
Person whose advice I trust	4.09 (.45)	4.08 (.34)	4.17 (.49)	.01

	M (SD)		
Cumulative Social Support [c]	58.40 (4.74)		

[a] Repeated measures analysis of variance (ANOVA)
[b] All items coded such that higher scores indicate higher levels of social support.
[c] Calculated by summing all social support items across the three measurement waves.
Cumulative scores could range from 15 to 75.

Table 8. *Self-rated Health and Predicted Self-rated Health Over Time (N = 281)*

	Baseline	1st Follow-up	2nd Follow-up	
	M (SD)	M (SD)	M (SD)	p [a]
Self-rated Health [b]	3.59 (.77)	3.47 (.80)	3.47 (.83)	.003
Predicted Self-rated Health [c]	3.60 (.78)	3.48 (.79)	3.47 (.83)	.001

	M (SD)			
Cumulative Self-rated Health [d]	10.55 (2.12)			
Cumulative Predicted Self-rated Health [e]	10.56 (2.11)			

[a] Repeated measures analysis of variance (ANOVA)
[b] Higher scores indicate better self-rated health today.
[c] Higher scores indicate better predicted self-rated health in one year.
[d] Calculated by summing the three self-rated health questions. Cumulative scores could range from 3 to 15.
[e] Calculated by summing the three predicted self-rated health questions. Cumulative scores could range from 3 to 15.

Table 9. *Chronic Diseases Over Time (N = 281)*

	Baseline	1st Follow-up	2nd Follow-up
	n (%)	n (%)	n (%)
High Blood Pressure	29 (9.7)	38 (12.8)	35 (11.7)
Heart Disease	10 (3.4)	10 (3.4)	9 (3.0)
Headaches	30 (10.1)	24 (8.1)	22 (7.4)
High Cholesterol	23 (7.7)	43 (14.4)	48 (16.1)
Sleep Apnea or Narcolepsy	9 (3.0)	6 (2.0)	10 (3.4)
Asthma	11 (3.7)	9 (3.0)	8 (2.7)
Diabetes	14 (4.7)	35 (11.7)	21 (7.0)
Arthritis or Rheumatism	55 (18.5)	17 (5.7)	58 (19.5)
Muscle or Tendon Disease	28 (9.4)	65 (21.8)	79 (26.5)
Any Skin Diseases	20 (6.7)	19 (6.4)	14 (4.7)
Ear, Nose, and Throat Disorders	45 (15.1)	21 (7.0)	28 (9.4)
Cancer	1 (.30)	1 (.30)	2 (.70)
	M (SD)		
Cumulative Chronic Diseases [a]	3.78 (4.52)		

[a] Calculated by summing all self-reported chronic diseases across the three measurement waves. Scores could range from 0 to 36.

Table 10. *Body Mass Index Over Time (N = 281)*

	Baseline	1st Follow-up	2nd Follow-up	
	M (SD)	M (SD)	M (SD)	p [a]
Body Mass Index (BMI)	26.52 (4.97)	27.12 (5.21)	27.25 (4.89)	.001

	M (SD)
Average BMI [b]	27.00 (4.65)

[a] Repeated measures analysis of variance (ANOVA)
[b] Calculated by averaging the three BMI measurements.

Note. Centers for Disease Control guidelines for Body Mass Index (BMI) include the following:

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and Above	Obese

Table from CDC: http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/

Table 11. *Sleep Apnea at 2nd Follow-up (N = 281)*

	n (%)
Do you snore?	
No	201 (71.90)
Yes	79 (28.10)

	M (SD)
Snoring loudness [a][b]	2.67 (.76)
Snoring frequency	3.70 (1.18)
Pauses in breathing during sleep	1.86 (1.31)
Tired after sleeping	1.85 (1.31)
Tired during wake time	1.69 (1.05)

	M (SD)
Cumulative Apnea Symptoms [c]	11.19 (4.63)

[a] All items are scored such that higher ratings indicate greater presence of symptoms. For specific items and scoring procedures refer to Appendix L.
[b] Items specifically addressing snoring (i.e., snoring loudness and snoring frequency) were only answered by those who responded "Yes" to the first question, "Do you snore?" (n = 79).
[c] Calculated by summing all sleep apnea items. Scores could range from 5 to 25.

Table 12. *Fit Indices for CES Temporal Stability Over Time*

	Df	χ^2	RMSEA	NNFI	CFI
Form Model [a]	28	636.90	.28	.83	.89
Pattern Model [b]	35	649.11	.25	.86	.88
Scalar Model [c]	40	683.12	.24	.87	.88
Strict Invariance Model 1 [d]	47	760.49	.23	.87	.87
Strict Invariance Model 2 [e]	48	760.38	.23	.89	.87
Strict Invariance Model 3 [f]	49	761.82	.23	.89	.87

[a] All parameters freely estimated for each time point.
[b] Factor loadings invariant across time points.
[c] Factor loadings and item means invariant across time points.
[d] Factor loadings, item means, and item residuals/error variances invariant across time points.
[e] Strict Invariance Model 1 plus latent variable means are invariant.
[f] Strict Invariance Model 1 plus latent variable means and variances are invariant.

Table 13. *Comparisons of Fit Indices to Assess CES Temporal Stability Over Time*

	Δdf	Δχ²	ΔRMSEA	ΔNNFI	ΔCFI
Form Model [a]	----	----	----	----	----
Pattern Model [b]	7	12.21	.03*	.03*	.01*
Scalar Model [c]	5	34.01	.01*	.01*	.00
Strict Invariance Model 1 [d]	7	77.37	.01*	.00	.01*
Strict Invariance Model 2 [e]	1	0.11	.00	.02*	.00
Strict Invariance Model 3 [f]	1	1.44	.00	.00	.00

[a] All parameters freely estimated for each time point.
[b] Factor loadings invariant across time points.
[c] Factor loadings and item means invariant across time points.
[d] Factor loadings, item means, and item residuals/error variances invariant across time points.
[e] Strict Invariance Model 1 plus latent variable means are invariant.
[f] Strict Invariance Model 1 plus latent variable means and variances are invariant.

*p<.05

Table 14. *Strict Invariance Model 3 Standardized Item Factor Loadings and Squared Multiple Correlations (SMCs) for CES Items Over Time*

	Factor Loading	SMC [b]
CES 1	0.50	0.44
CES 2	0.18	0.18
CES 3	0.73	0.62
CES 4	0.74	0.62
CES 5	0.92	0.88
CES 6	0.73	0.66
CES 7	0.93	0.84

Note: All factor loadings were significant at *p* <.05.

[a] Factor loadings, item means, item variances, latent variable means, latent variable variances were held invariant across the two time points.
[b] Individual item squared multiple correlations represent the portion of unique variance in the latent variable (e.g., CES) associated with that particular item in that specific model.

Table 15. *Effect of Cumulative Trauma on Event Centrality*

	Step 1[a]	Step 2[b]	
	β [c]	β	sr^{2} [d]
Age	.27***	.25***	.06
Gender (reference = male)	-.06	.02	<.001
Education (reference =≤ high school)	-.07	-.08	.006
Cumulative Pre-Displacement Trauma [e]		.29***	.07
R^2	.08	.15	
R^2 change		.07***	

[a] Step 1 includes all control variables.
[b] Step 2 introduces cumulative pre-displacement trauma.
[c] Standardized regression coefficients
[d] Squared semi-partial correlation coefficient which represents the proportion of variance uniquely associated with the respective predictor variable for the final model (Step 2).
[e] Harvard Trauma Questionnaire sum score. Range 0 to 39.
*p<.05, **p<.01, ***p<.001

Table 16. *Effect of Specific Trauma Type on Event Centrality*

	Step 1[a]	Step 2[b]	
	β [c]	β	sr^{2} [d]
Age	.27***	.24***	.05
Gender (reference = male)	-.05	.05	.002
Education (reference =≤ high school)	-.07	-.06	.003
Physical Trauma To Others [e]		.04	.002
Physical Trauma To Self [f]		.51***	.25
Lack of Necessities [g]		.05	.003
Abduction of Family Member or Friend [h]		.09	.007
Persecution / Coercion [i]		.06	.004
R^2	.08	.35	
R^2 change		.27***	

[a] Step 1 includes all control variables.
[b] Step 2 introduces cumulative pre-displacement trauma.
[c] Standardized regression coefficients
[d] Squared semi-partial correlation coefficient which represents the proportion of variance uniquely associated with the respective predictor variable.
[e] Physical trauma to others scores range from 0 to 7.
[f] Physical trauma to self scores range from 0 to 3.
[g] Lack of necessities scores range from 0 to 3.
[h] Abduction of family member or friend scores range from 0 to 4.
[i] Persecution / coercion scores range from 0 to 5.
*p<.05, **p<.01, ***p<.001

Table 17. *Fit Indices for "Predictor" vs. "Reflector" Models*

	Df	χ^2	RMSEA	NNFI	CFI
"Predictor"					
1. Correlated Variables	251	1282.90	.128	.888	.898
2. Correlated Variables and Symptoms	248	1245.97	.127	.890	.901
"Reflector"					
3. One Factor	252	1897.71	.183	.822	.837
4. Higher Order	248	1365.65	.127	.890	.901

Table 18. *Fit Indices Comparisons for "Predictor" vs. "Reflector" Models*

	Δdf	$\Delta\chi^2$	ΔRMSEA	ΔNNFI	ΔCFI
Model 1 vs. Model 2	3	36.93*	.001	.002	.003
Model 1 vs. Model 3	1	614.81*	.055*	.066*	.060*
Model 1 vs. Model 4	3	82.75*	.001	.002	.003
Model 2 vs. Model 3	4	651.74*	.056*	.068*	.064*
Model 2 vs. Model 4	0	119.68	.000	.000	.000
Model 3 vs. Model 4	4	532.06*	.056*	.068*	.064*

*p<.05 or a change greater than 0.01 indicating a significant difference.

Table 19. *Standardized Factor Loadings for Individual CES and PCL Items in "Predictor" and "Reflector" Models*

	"Predictor"		"Reflector"	
	Model 1	Model 2	Model 3	Model 4
PCL 1	0.43	1.00	0.47	1.00
PCL 2	0.28	0.64	0.26	0.64
PCL 3	0.23	0.51	0.21	0.51
PCL 4	0.45	1.03	0.46	1.03
PCL 5	0.23	0.53	0.22	0.53
PCL 6	0.38	1.00	0.36	1.00
PCL 7	0.19	0.53	0.17	0.53
PCL 8	0.10	0.28	0.09	0.28
PCL 9	0.38	0.97	0.37	0.97
PCL 10	0.16	0.39	0.15	0.39
PCL 11	0.08	0.21	0.07	0.21
PCL 12	0.15	0.41	0.16	0.41
PCL 13	0.51	1.00	0.46	1.00
PCL 14	0.34	0.72	0.31	0.72
PCL 15	0.48	0.99	0.43	0.99
PCL 16	0.35	0.78	0.31	0.78
PCL 17	0.36	0.86	0.32	0.86
CES 1	0.48	1.00	0.47	1.00
CES 2	0.10	0.21	0.11	0.21

CES 3	0.74	1.56	0.63	1.56
CES 4	0.76	1.59	0.67	1.59
CES 5	0.86	1.81	0.62	1.81
CES 6	0.69	1.45	0.61	1.45
CES 7	0.88	1.85	0.68	1.85

Note: All factor loadings were significant at $p < .05$.

Table 20. *Standardized Factor Loadings for Latent Variables for "Predictor" and "Reflector" Models*

	Model 1	Model 2	Model 3	Model 4
Corr. PTSD and Event Centrality	0.59*	----	----	----
PTSD and Re-experiencing	----	0.45*	----	0.45*
PTSD and Avoidance/Numbing	----	0.37*	----	0.37*
PTSD and Hyper-arousal	----	0.42*	----	0.43*
PTSD and Event Centrality	----	----	----	0.29*

*$p < .05$

Table 21. *Squared Multiple Correlations (SMCs) for PCL and CES Items in the "Predictor" and "Reflector" Models*

| | "Predictor" | | "Reflector" | |
	Model 1	Model 2	Model 3	Model 4
PCL 1	0.31	0.34	0.36	0.34
PCL 2	0.48	0.49	0.40	0.49
PCL 3	0.49	0.50	0.41	0.50
PCL 4	0.58	0.61	0.61	0.61
PCL 5	0.47	0.49	0.40	0.49
PCL 6	0.59	0.61	0.52	0.61
PCL 7	0.40	0.46	0.31	0.46
PCL 8	0.23	0.26	0.17	0.26
PCL 9	0.39	0.38	0.37	0.38
PCL 10	0.16	0.15	0.14	0.15
PCL 11	0.15	0.15	0.11	0.15
PCL 12	0.15	0.16	0.17	0.16
PCL 13	0.34	0.32	0.27	0.32
PCL 14	0.19	0.21	0.16	0.21
PCL 15	0.43	0.45	0.35	0.45
PCL 16	0.51	0.63	0.40	0.63
PCL 17	0.38	0.52	0.30	0.52
CES 1	0.47	0.47	0.46	0.47
CES 2	0.07	0.07	0.09	0.07

CES 3	0.67	0.68	0.48	0.68
CES 4	0.68	0.68	0.52	0.68
CES 5	0.79	0.79	0.41	0.79
CES 6	0.67	0.67	0.52	0.67
CES 7	0.73	0.73	0.44	0.73

Note. Individual item squared multiple correlations represent the portion of unique variance in the latent variable (e.g., PTSD) associated with that particular item in that specific model. This number represents the reliability of that item to measure the associated latent variable (e.g., how well does CES item 1 measure Event Centrlaity?).

Table 22. *Squared Multiple Correlations (SMCs) for the Latent Variables in the "Predictor" and "Reflector" Models*

	Model 1	Model 2	Model 3	Model 4
Re-experiencing	----	1.06	----	1.06
Avoidance/Numbing	----	0.92	----	0.92
Hyper-arousal	----	0.76	----	0.76
Event Centrality	----	----	----	0.37

Note. Latent variable squared multiple correlations represent the portion of unique variance in the latent variable (e.g., Event Centrality) associated with or explained by the set of indicators (e.g., CES items 1 – 7). This number is similar to R^2 in regression analysis.

Table 23. *Criterion Validity of the Centrality of Event Scale (CES) to Assess Poor Global Functioning With PTSD Symptoms Included in the Models*

Dependent Variable	Predictor Variables	β [a]	sr^{2} [b]
Post-displacement trauma [c]	Gender (male = reference)	-.07	.005
	Age	.02	.004
	Education (< high school= ref.)	-.10	<.001
	PTSD Symptoms [d]	.40***	.10
	CES Scores [e]	.009	<.001
Daily Hassles [f]	Gender (male = reference)	.08	.007
	Age	.18**	.03
	Education (< high school= ref.)	-.23***	.06
	PTSD Symptoms	.28***	.06
	CES Scores	.13†	.01
Social Support [g]	Gender (male = reference)	-.06	.004
	Age	.07	.004
	Education (< high school= ref.)	.11	.01
	PTSD Symptoms	-.17*	.02
	CES Scores	-.002	<.001
Self-rated Health [h]	Gender (male = reference)	-.006	<.001
	Age	-.57***	.38
	Education (< high school= ref.)	.05	<.006
	PTSD Symptoms	-.23***	.07
	CES Scores	-.10*	.01
Predicted Self-rated Health [i]	Gender (male = reference)	-.004	<.001
	Age	-.58***	.39
	Education (< high school= ref.)	.06	.007
	PTSD Symptoms	-.23***	.07
	CES Scores	-.10*	.01

Chronic Diseases [j]	Gender (male = reference)	-.02	.001
	Age	.53***	.35
	Education (< high school= ref.)	-.06	.007
	PTSD Symptoms	.32***	.12
	CES Scores	.09[†]	.01
BMI [k]	Gender (male = reference)	-.12	.01
	Age	.25***	.06
	Education (< high school= ref.)	-.02	<.001
	PTSD Symptoms	.18**	.02
	CES Scores	-.04	.001
Sleep Apnea [l]	Gender (male = reference)	-.26***	.08
	Age	.33***	.12
	Education (< high school= ref.)	-.03	-.002
	PTSD Symptoms	.31***	.08
	CES Scores	-.05	.003

Note. Values are from the final step in the hierarchal regression models.

[a] Standardized regression coefficients

[b] Squared semi-partial correlation coefficient which represents the proportion of variance uniquely associated with the respective predictor variable.

[c] Post-displacement trauma calculated by summing all post-displacement trauma exposures. Scores could range from 0 to 115.

[d] PTSD assessed at 2nd Follow-up using the PCL-C. Theoretical range from 17 to 85 with higher scores reflecting greater PTSD symptoms.

[e] Event centrality assessed at 2nd Follow-up using the CES. Theoretical range from 7 to 35 with higher scores reflecting higher event centrality.

[f] Daily hassles calculated by summing hassles across the three measurement waves. Scores could range from 0 to 30. Higher scores reflect higher reported hassles.

[g] Social support calculated by summing all social support items across the three measurement waves. Cumulative scores could range from 15 to 75. Higher scores reflect greater social support.

[h] Self-rated health calculated by summing the three self-rated health questions. Cumulative scores could range from 3 to 15. Higher scores reflect better self-reported health.

[i] Predicted self-rated health calculated by summing the three predicted self-rated health questions. Cumulative scores could range from 3 to 15. Higher scores reflect better predicted self-rated health one year from measurement.

[j] Chronic diseases calculated by summing all self-reported chronic diseases across the three measurement waves. Scores could range from 0 to 36.
[k] BMI calculated by averaging the three BMI measurements.
[l] Sleep apnea calculated by summing all sleep apnea items measured at 2nd Follow-up. Scores could range from 5 to 25. Higher values represent more sleep apnea symptoms.
[†] $p \leq .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 24. *Logistic Regression Predicting a History of Unemployment With Event Centrality Scores and PTSD Symptoms*

	OR (95% CI)
Gender (reference = male)	4.31*** (2.35, 7.92)
Education (reference =≤ high school)	.79 (.41, 1.52)
Age	1.08*** (1.05, 1.11)
PTSD Symptoms [a]	1.07 (1.00, 1.14)
Event Centrality [b]	1.01 (.94, 1.09)

Note: CI = confidence interval; OR = odds ratio.
[a] PTSD assessed at 2nd Follow-up using the PCL-C. Theoretical range from 17 to 85 with higher scores reflecting greater PTSD symptoms.
[b] Event centrality assessed at 2nd Follow-up using the CES. Theoretical range from 7 to 35 with higher scores reflecting higher event centrality.
* $p <.05$, ** $p <.01$, *** $p <.001$

Table 25. *Criterion Validity of the Centrality of Event Scales (CES) to Assess Poor Global Functioning*

Dependent Variable	Predictor Variables	β [a]	sr^{2} [b]
Post-displacement trauma [c]	Gender (male = reference)	-.04	.002
	Age	.10	.01
	Education (< high school= ref.)	-.15*	.02
	CES Scores [d]	.22***	.05
Daily Hassles [e]	Gender (male = reference)	.10	.01
	Age	.23***	.06
	Education (< high school= ref.)	-.26***	.07
	CES Scores	.02	<.001
Social Support [f]	Gender (male = reference)	-.07	.005
	Age	.03	<.001
	Education (< high school= ref.)	.13*	.02
	CES Scores	-.09	.007
Self-rated Health [g]	Gender (male = reference)	-.02	<.001
	Age	-.62***	.42
	Education (< high school= ref.)	.08[†]	.01
	CES Scores	-.22***	.08
Predicted Self-rated Health [h]	Gender (male = reference)	-.02	<.001
	Age	-.62***	.42
	Education (< high school= ref.)	.08[†]	.01
	CES Scores	-.22***	.09
Chronic Diseases [i]	Gender (male = reference)	-.002	<.001
	Age	.59***	.39
	Education (< high school= ref.)	-.09*	.02
	CES Scores	.26***	.11

BMI [j]	Gender (male = reference)	-.11	.01
	Age	.29***	.08
	Education (< high school= ref.)	-.04	.002
	CES Scores	.05	.002

Sleep Apnea [k]	Gender (male = reference)	-.24***	.07
	Age	.39***	.16
	Education (< high school= ref.)	-.07	.006
	CES Scores	.11*	.01

Note. Values are from the final step in the hierarchal regression models.

[a] Standardized regression coefficients

[b] Squared semi-partial correlation coefficient which represents the proportion of variance uniquely associated with the respective predictor variable.

[c] Post-displacement trauma calculated by summing all post-displacement trauma exposures. Scores could range from 0 to 115.

[d] Event centrality assessed at 2nd Follow-up using the CES. Theoretical range from 7 to 35 with higher scores reflecting higher event centrality.

[e] Daily hassles calculated by summing hassles across the three measurement waves. Scores could range from 0 to 30. Higher scores reflect a higher number of daily hassles.

[f] Social support calculated by summing all social support items across the three measurement waves. Cumulative scores could range from 15 to 75. Higher scores reflect more social support.

[g] Self-rated health calculated by summing the three self-rated health questions. Cumulative scores could range from 3 to 15. Higher scores reflect higher self-reported health.

[h] Predicted self-rated health calculated by summing the three predicted self-rated health questions. Cumulative scores could range from 3 to 15.

[i] Chronic diseases calculated by summing all self-reported chronic diseases across the three measurement waves. Scores could range from 0 to 36. Higher scores reflect higher predicted self-reported health.

[j] BMI calculated by averaging the three BMI measurements.

[k] Sleep apnea calculated by summing all sleep apnea items measured at 2nd Follow-up. Scores could range from 5 to 25. Higher scores represent more sleep apnea symptoms.

[†] $p \leq .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 26. *Logistic Regression Predicting a History of Unemployment with Event Centrality Scores*

	OR (95% CI)
Gender (reference = male)	4.42*** (2.42, 8.09)
Education (reference =≤ high school)	.72 (.38, 1.38)
Age	1.09*** (1.06, 1.12)
Event Centrality [a]	1.05 (.99, 1.12)

Note: CI = confidence interval; OR = odds ratio.
[a] Event centrality assessed at 2nd Follow-up using the CES. Theoretical range from 7 to 35 with higher scores reflecting higher event centrality.
* *p* <.05, ** *p* <.01, *** *p* <.001

Table 27. *2nd Follow-Up CES Straight-Line Responders Compared to Valid Responders (N = 281).*

	Straight-Line (n=160)	Valid (n=121)	*p*
	n (%)	n (%)	
Gender			.40
Female	70 (43.75)	59 (48.76)	
Male	90 (56.25)	62 (51.24)	
Education			.85
High School or Less	112 (70.00)	86 (71.07)	
Greater than High School	48 (30.00)	35 (28.93)	
Employment Status [a]			.01
Employed	117 (73.13)	71 (58.67)	
Unemployed	42 (26.25)	50 (41.33)	
	M (SD)	M (SD)	
Age (years)	30.70 (10.28)	36.60 (11.41)	<.001
Pre-displacement trauma [b]	11.57 (3.40)	13.72 (3.13)	<.001
Post-displacement trauma [c]	3.54 (1.84)	4.25 (2.15)	.01
Daily Hassles [d]	8.84 (2.14)	9.12 (2.32)	.30
Social Support [e]	58.63 (4.40)	58.09 (5.15)	.35
Self-rated health [f]	11.15 (1.68)	9.78 (2.38)	<.001
Predicted self-rated health [g]	11.15 (1.66)	9.79 (2.38)	<.001

Chronic diseases [h]	2.48 (3.43)	5.50 (5.19)	<.001
BMI [i]	26.41 (4.42)	27.77 (4.83)	.01
Sleep apnea [j]	4.68 (3.61)	6.49 (5.14)	.01
PTSD symptoms [k]	18.96 (2.73)	23.76 (6.82)	<.001
CES Scores [l]	14.14 (1.24)	21.39 (4.40)	<.001

Note. Dichotomous variables were compared using χ^2 tests. Continuous variables were compared using *t*-tests.

[a] Employment status assessed at 2nd Follow-Up.

[b] Harvard Trauma Questionnaire sum score. Range 0 to 39. Assessed at Baseline.

[c] Post-displacement trauma calculated by summing all post-displacement trauma exposures. Scores could range from 0 to 115.

[d] Daily hassles calculated by summing hassles across the three measurement waves. Scores could range from 0 to 30. Higher scores reflect more daily hassles.

[e] Social support calculated by summing all social support items across the three measurement waves. Cumulative scores could range from 15 to 75. Higher scores reflect greater social support.

[f] Self-rated health calculated by summing the three self-rated health questions. Cumulative scores could range from 3 to 15. Higher scores reflect higher self-reported health.

[g] Predicted self-rated health calculated by summing the three predicted self-rated health questions. Cumulative scores could range from 3 to 15. Higher scores reflect higher predicted self-reported health.

[h] Chronic diseases calculated by summing all self-reported chronic diseases across the three measurement waves. Scores could range from 0 to 36.

[i] BMI calculated by averaging the three BMI measurements.

[j] Sleep apnea calculated by summing all sleep apnea items measured at 2nd Follow-up. Scores could range from 5 to 25. Higher scores reflect more sleep apnea symptoms.

[k] PTSD assessed at 2nd Follow-up using the PCL-C. Theoretical range from 17 to 85 with higher scores reflecting greater PTSD symptoms.

[l] Event centrality assessed at 2nd Follow-up using the CES. Theoretical range from 7 to 35 with higher scores reflecting higher event centrality.
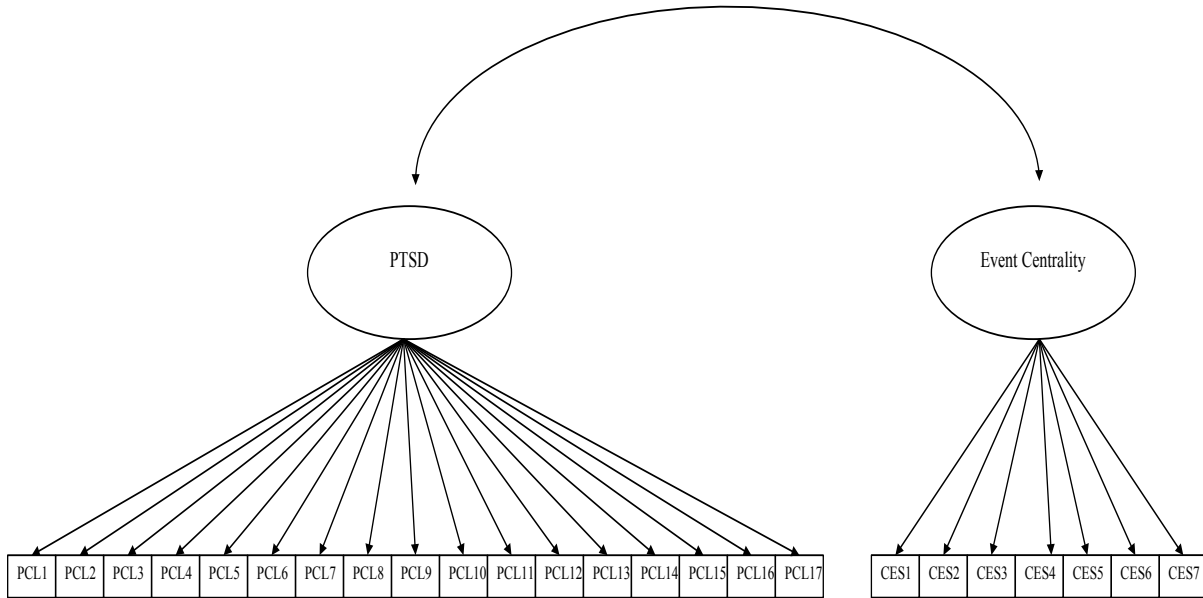
Figure 1. Correlated variables model with PTSD and CES as distinct variables.
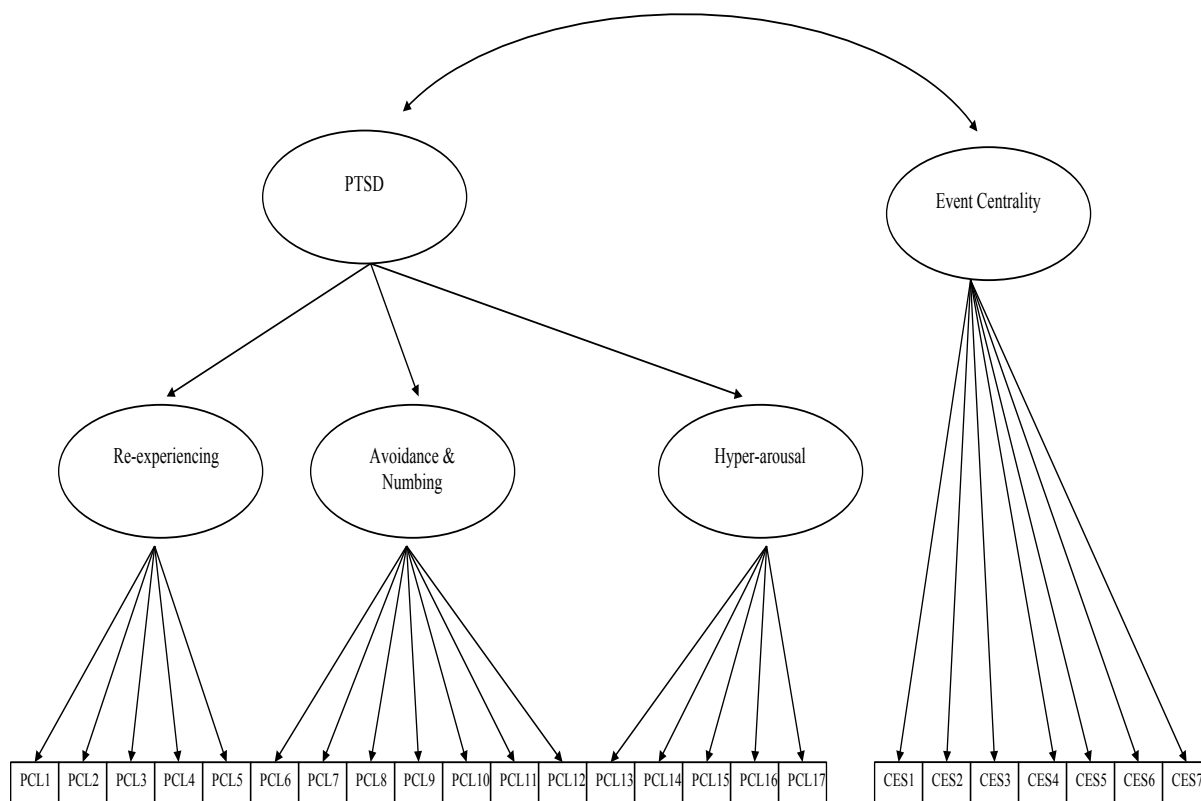
Figure 2. Correlated variables and symptoms model with PTSD as three distinct symptom clusters and CES as a separate and distinct variable.
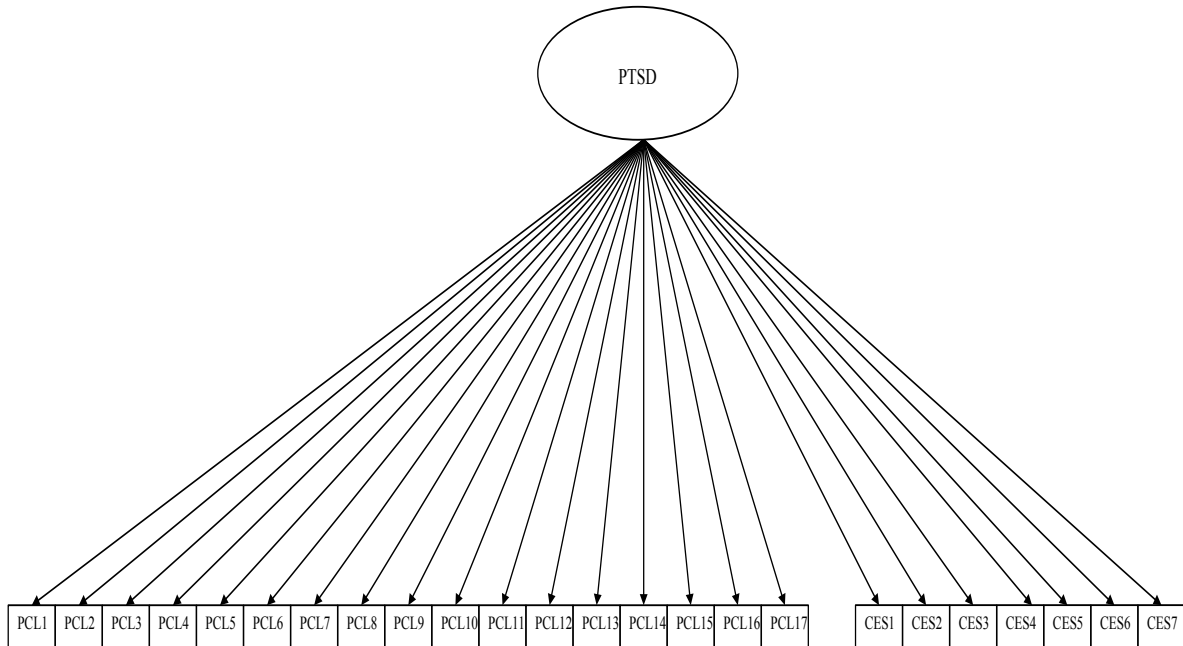
Figure 3. One factor model with PTSD as a homogeneous factor and CES considered a non-distinct symptom of PTSD.
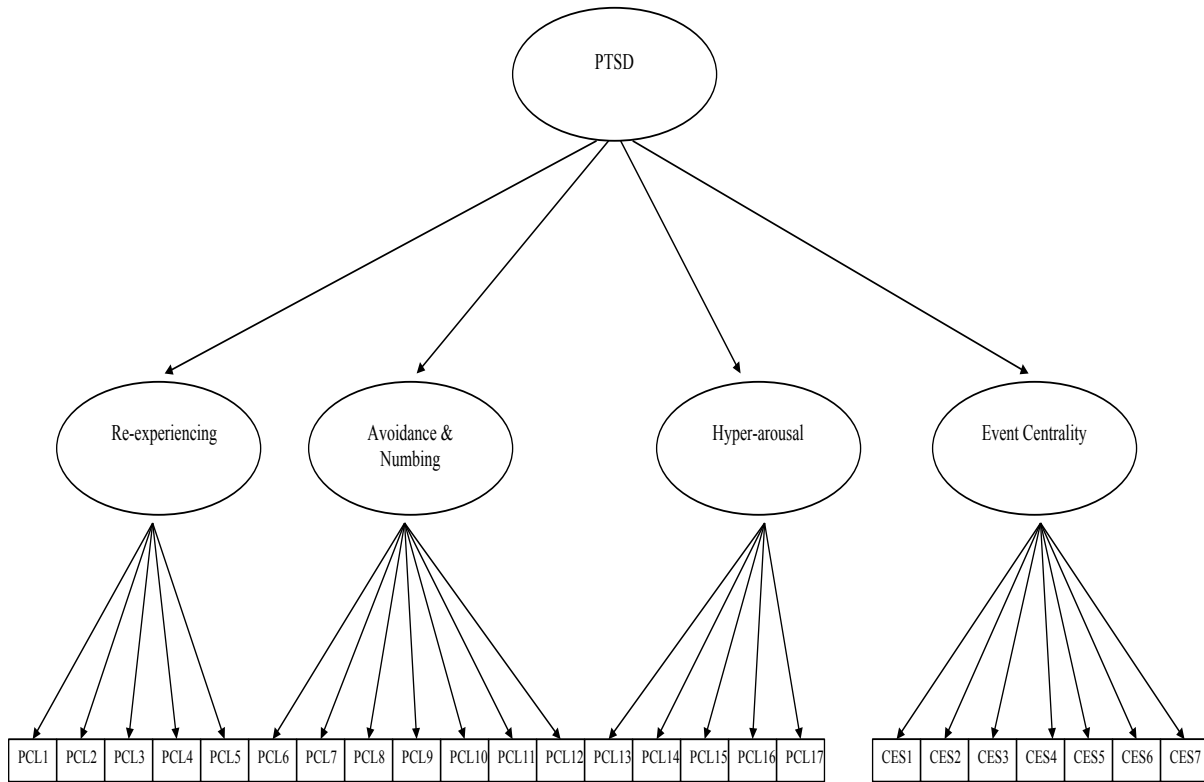
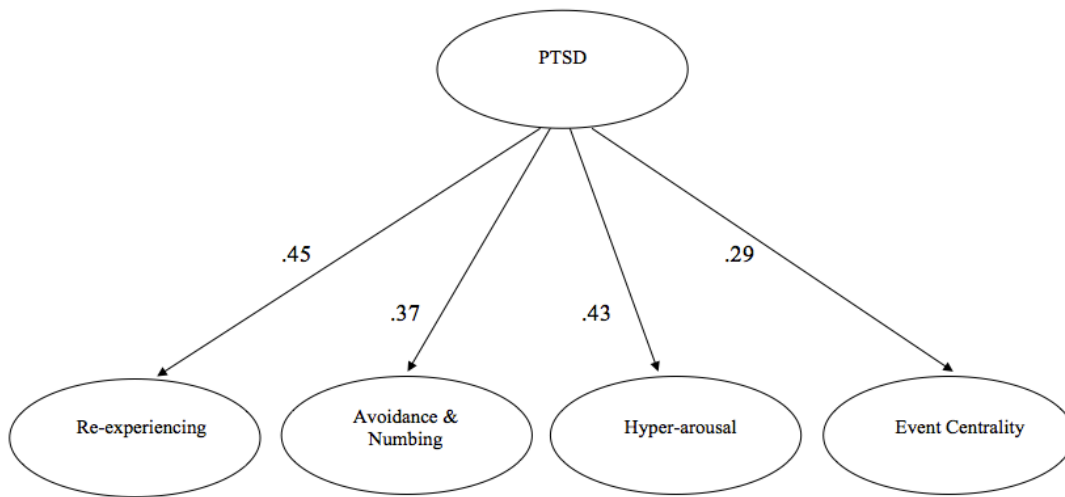Figure 4. Higher order model with CES as a symptom of PTSD.

Figure 5. Model 4. Higher order "Reflector" model with factor loadings.

APPENDIX A

Research Informed Consent

Title of Study: Mental Health in Iraqi Refugees: Importance of post-displacement social stressors
and institutional resources

Principal Investigator (PI):   Bengt B. Arnetz, MD, PhD
                                Family Medicine and Public Health Sciences
                                (313) 577-6858

Purpose of the Study

In this research study, we plan to:

❖ Study the effects that resettlement has on Iraqi refugees in the Metropolitan Detroit area as
   compared to immigrants from non-war/non-conflict exposed Middle East countries.
❖ Evaluate how institutional support and the services provided to refugees after arrival in the
   United States impact their health.
❖ Evaluate long term mental health and social integration of refugees and immigrants within a
   three-year time span, and on a regular basis after these initial three years.
❖ Examine the relationship between the ability to adapt to life in Michigan and making use of
   the government-provided services (such as job and language training).

Study Procedures

❖ If you agree to take part in this research study, you will be asked to fill out a questionnaire
   that contains demographic questions, and questions that inquire about your mental and
   behavioral functioning, trauma exposure, and social adjustment in the USA.
❖ The researcher will initially contact you one year and 2 years later and ask you to fill an identical
   questionnaire. You are free to choose the time and the place for the meetings. In subsequent years,
   the researchers might continue to contact you on a regular basis, most likely every year or
   every second year, to ask about your interest in continuing to be part of the study.
❖ Filling the questionnaire takes 60-90 minutes.
❖ Wayne State University will keep the questionnaire in a locked cabinet where it will be
   inaccessible except for research purposes supervised by the principle investigator. Each
   questionnaire will be assigned an identification number rather than using the name of the
   participant. The master list linking your name and ID number will be kept in a locked cabinet
   in a secure office. If you decide that you do not want to participate in this third round of
   interviews, that is in today's interview, or you do not want to be part in the subsequent
   follow-up requests, the list will be destroyed at the end of data collection.

Benefits

There are no direct benefits for you; however, information from this study may benefit other
people now or in the future.

Risks

By taking part in this study, you may experience emotional risks. Feelings of sadness or anxiety
are possible and could be experienced by some people when discussing sensitive topics related to

their past experiences. Participants will be provided with referral information for ACCESS behavioral health outpatient facilities as well as Wayne State University's Psychology clinic, and other local community mental health facilities.

Study Costs

Participation in this study will be of no cost to you.

Compensation

Each participant will receive a gift certificate to a local store in the amount of $35.00 after each completed survey. At time three, today, you will be receiving a gift certificate to a local store in the amount of $70.00. Participants will receive a total of $140.00 worth of gift certificates if they complete all three testing sessions. If you decide to participate in future studies, the exact reimbursement will be adjusted for inflation; however, the reimbursement for interviews occurring during the next 5 years will be $35.00 per interview.

Research Related Injuries

Research related injuries are extremely unlikely; however, in the event that this research related activity results in an injury, treatment will be made available including first aid, emergency treatment, and follow-up care as needed. No reimbursement, compensation, or free medical care is offered by Wayne State If you think that you have suffered a research related injury, contact the PI right away at (313) 577-2644

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you decide to take part in the study you can later change your mind and withdraw from the study. You are free to only answer questions that you want to answer. You are free to withdraw from participation in this study at any time. Your decisions will not change any present or future relationship with Wayne State University or its affiliates, or other services you are entitled to receive. The PI may stop your participation in this study without your consent. The PI will make the decision and let you know if it is not possible for you to continue. The decision that is made is to protect your health and safety, or because you did not follow the instructions to take part in the study. While taking part in this study you will be told of any important new findings that may change your willingness to continue to take part in the research.

Questions

If you have any questions about this study now or in the future, you may contact Dr. Bengt Arnetz or one of his research team members at the following phone number **(313) 577-2644**. If you have questions or concerns about your rights as a research participant, the Chair of the Human Investigation Committee can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call (313) 577-1628 to ask questions or voice concerns or complaints.

Consent to Participate in The Study

With my signature on this consent I acknowledge that I have read the contents of this document (or was read to me by someone I trust) and that I have received answers to all my inquiries.

_____   _____

Signature of participant   Date

_____   _____

Signature of researcher   Date

_____   _____

File Number of the Questionnaire   Date of the Interview

APPENDIX B

Centrality of Event Scale

Please think back upon the most stressful or traumatic event in your life and answer the following questions:

1	I feel that this event has become a part of my identity.	[1] Totally Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Totally Agree
2	This event has become a reference point for the way I understand myself and the world.	[1] Totally Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Totally Agree
3	I feel that this event has become a central part of my life story.	[1] Totally Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Totally Agree
4	I feel that this event has influenced the way I think and feel about other experiences.	[1] Totally Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Totally Agree
5	This event has permanently changed my life.	[1] Totally Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Totally Agree
6	I often think about the effects this event will have on my future.	[1] Totally Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Totally Agree

7	This event was a turning point in my life.	[1]	[2]	[3]	[4]	[5]
		Totally Disagree	Disagree	Undecided	Agree	Totally Agree

APPENDIX C

Measurement Invariance Models for Testing Temporal Stability
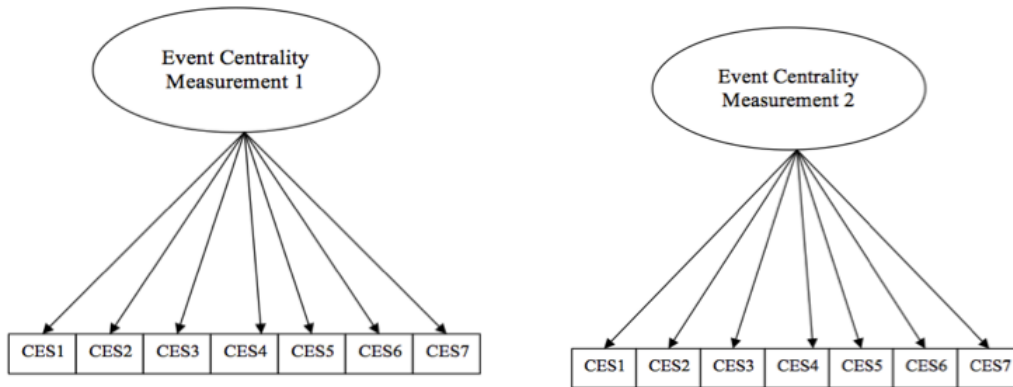
Model 1: All parameters are allowed to be freely estimated for both measurement points (i.e., no constraints are made to make any aspects similar over the two time points).
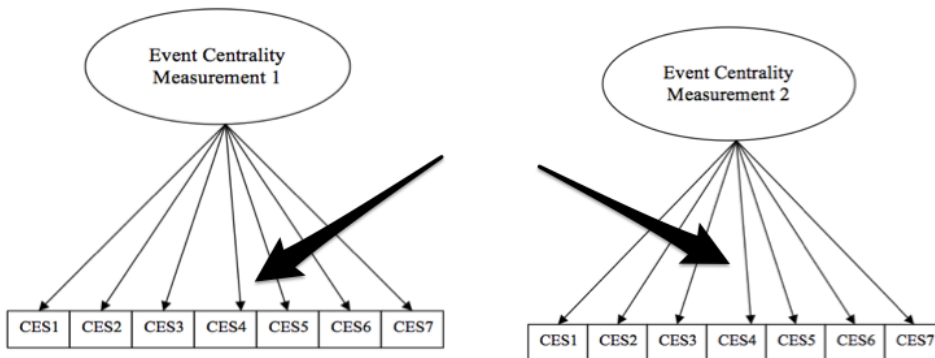
Model 2: All prior constraints plus factor loadings are similar across time (e.g., association between CES4 and its respective latent variable is similar across time points).
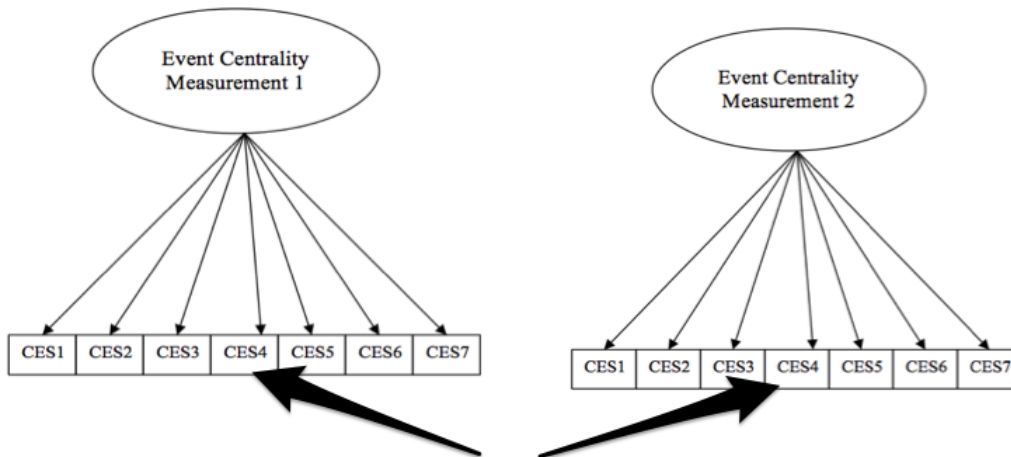
Model 3: All prior constraints plus item means are similar across time (e.g., means for CES4 are similar across measurement points).
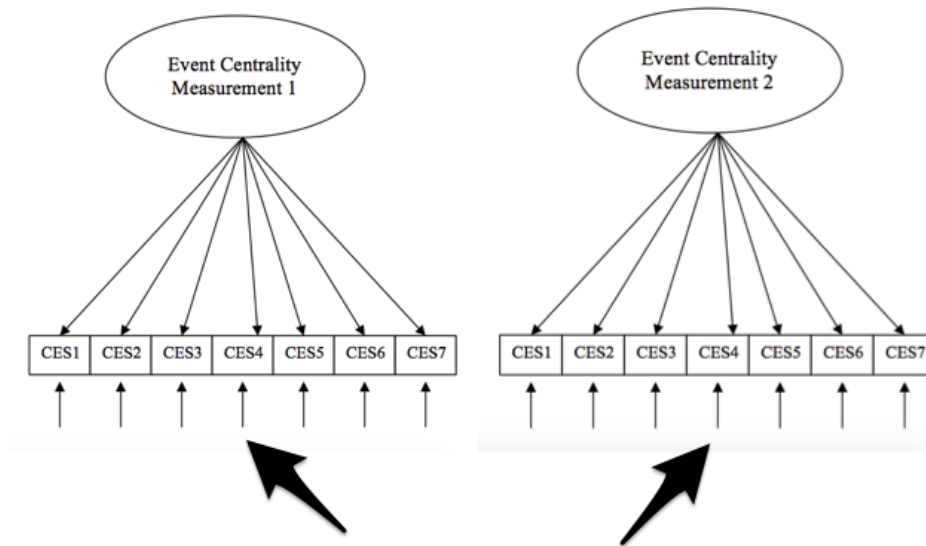
Model 4: All prior constraints plus item residuals also invariant across times (e.g., variance for CES4 similar across time).
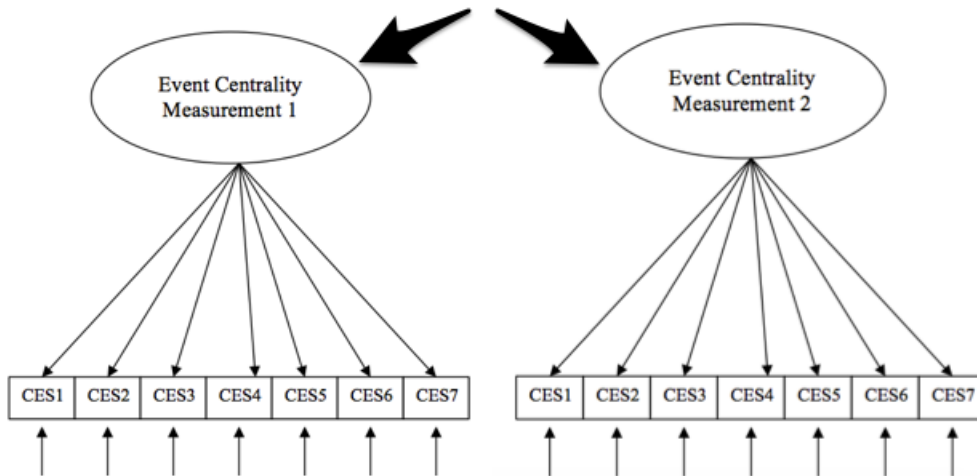
Model 5: All prior constraints plus latent variable means (i.e., scale averages) are similar over time.
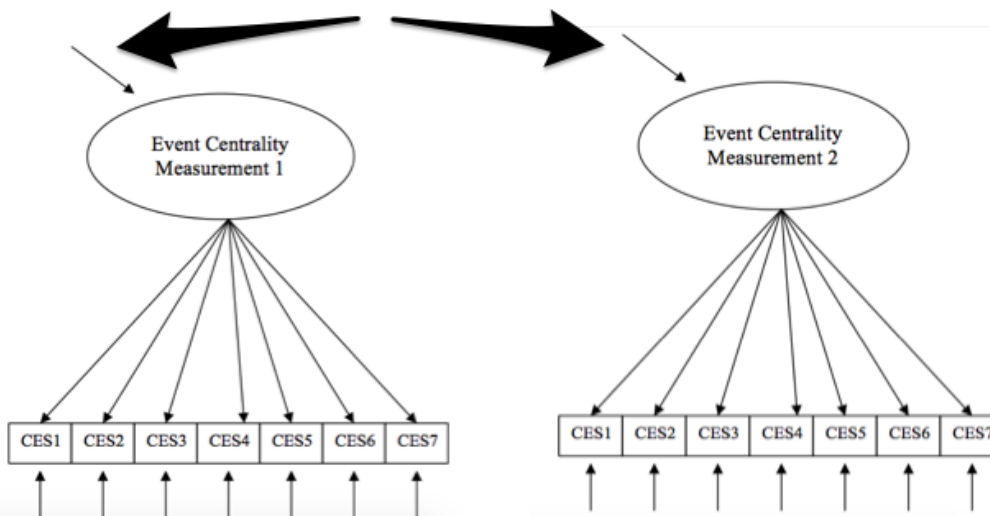
Model 6: All prior constraints plus latent variable residuals (i.e., variances of the overall scale) are similar.

APPENDIX D

Pre-displacement Trauma

Harvard Trauma Questionnaire (HTQ)

Please circle "YES" or "NO" for each question to indicate whether or not you have experienced any of the following events before coming to the U.S.

1	Oppressed because of ethnicity, religion, or sect	[1]Yes	[2]No
2	Present while someone searched for people or things in your home	[1]Yes	[2]No
3	Searched arbitrarily	[1]Yes	[2]No
4	Property looted, confiscated, or destroyed	[1]Yes	[2]No
5	Forced to settle in a different part of the country with minimal services	[1]Yes	[2]No
6	Imprisoned arbitrarily	[1]Yes	[2]No
7	Suffered ill health without access to medical care or medicine	[1]Yes	[2]No
8	Suffered from lack of food or clean water	[1]Yes	[2]No
9	Forced to flee your country or place of settlement	[1]Yes	[2]No
10	Expelled from your country based on ancestral origin, religion, or sect	[1]Yes	[2]No
11	Lacked shelter	[1]Yes	[2]No
12	Witnessed the desecration or destruction of religious shrines or places of religious instruction	[1]Yes	[2]No

13	Witnessed the arrest, torture, or execution of religious leaders or important members of tribe	[1]Yes	[2]No
14	Witnessed execution of civilians	[1]Yes	[2]No
15	Witnessed shelling, burning, or razing of residential areas or marshlands	[1]Yes	[2]No
16	Witnessed or heard combat situation (explosions, artillery fire, shelling) or landmine	[1]Yes	[2]No
17	Serious physical injury from combat situation or landmine	[1]Yes	[2]No
18	Witnessed rotting corpses	[1]Yes	[2]No
19	Confined to home because of chaos and violence outside	[1]Yes	[2]No
20	Witnessed someone being physically harmed (beating, knifing etc.)	[1]Yes	[2]No
21	Witnessed sexual abuse or rape	[1]Yes	[2]No
22	Witnessed torture	[1]Yes	[2]No
23	Witnessed murder	[1]Yes	[2]No
24	Forced to inform on someone placing them at risk of injury or death	[1]Yes	[2]No
25	Forced to destroy someone's property	[1]Yes	[2]No
26	Forced to physically harm someone (beating, knifing, etc.)	[1]Yes	[2]No

27	Murder of violent death of family member (child, spouse) or friend	[1]Yes	[2]No
28	Forced to pay for bullet used to kill family member	[1]Yes	[2]No
29	Received the body of a family member and prohibited from mourning them and performing burial rites	[1]Yes	[2]No
30	Disappearance of family member (child, spouse etc.) or friend	[1]Yes	[2]No
31	Kidnapping of family member (child, spouse, etc.) or friend	[1]Yes	[2]No
32	Family member (child, spouse, etc.) or friend taken as hostage	[1]Yes	[2]No
33	Someone informed on you placing you and your family at risk of injury or death	[1]Yes	[2]No
34	Physically harmed (beaten, knifed, etc.)	[1]Yes	[2]No
35	Kidnapped	[1]Yes	[2]No
36	Taken as hostage	[1]Yes	[2]No
37	Heard about frightening, dangerous events that occurred to someone else but that you did not experience yourself	[1]Yes	[2]No
38	Sexually abused or raped	[1]Yes	[2]No
39	Coerced to have sex for survival	[1]Yes	[2]No

APPENDIX E

Harvard Trauma Questionnaire (HTQ) Trauma Subtypes

Personal Trauma to Self

1   Physically harmed (beaten, knifed, etc.)

2   Kidnapped

3   Taken as hostage

Physical Trauma to Others

4   Witnessed someone being physically harmed (beating, knifing etc.)

5   Witnessed murder

6   Witnessed execution of civilians

7   Witnessed rotting corpses

8   Searched arbitrarily

9   Witnessed shelling, burning, or razing of residential areas or marshlands

10   Present while someone searched for people or things in your home

Lack of Necessities

11   Suffered from lack of food or clean water

12   Suffered ill health without access to medical care or medicine

13   Lacked shelter

Abduction of Family Member or Friend

14   Family member (child, spouse, etc.) or friend taken as hostage

15   Kidnapping of family member (child, spouse, etc.) or friend

16   Disappearance of family member (child, spouse etc.) or friend

17   Murder of violent death of family member (child, spouse) or friend

Persecution / Coercion

18   Forced to flee your country or place of settlement

19   Forced to settle in a different part of the country with minimal services

20   Oppressed because of ethnicity, religion, or sect

21   Someone informed on you placing you and your family at risk of injury or death

22   Witnessed the desecration or destruction of religious shrines or places of religious
         instruction

APPENDIX F

Structured Clinical Interview for PTSD Diagnosis

P O S T T R A U M A T I C S T R E S S D I S O R D E R

S o m e t i m e s t h i n g s h a p p e n t o p e o p l e t h a t a r e e x t r e m e l y u p s e t t i n g -
- t h i n g s l i k e b e i n g i n a l i f e t h r e a t e n i n g s i t u a t i o n l i k e a m a j o r
d i s a s t e r , v e r y s e r i o u s a c c i d e n t o r f i r e ; b e i n g p h y s i c a l l y
a s s a u l t e d o r r a p e d ; s e e i n g a n o t h e r p e r s o n k i l l e d o r d e a d , o r
b a d l y h u r t , o r h e a r i n g a b o u t s o m e t h i n g h o r r i b l e t h a t h a s
h a p p e n e d t o s o m e o n e y o u a r e c l o s e t o . A t a n y t i m e d u r i n g y o u r
l i f e , h a v e a n y o f t h e s e k i n d s o f t h i n g s h a p p e n e d t o y o u ?

L I S T O N L Y T R A U M A T I C E X P E R I E N C E S C O R R E S P O N D I N G I N
S E V E R I T Y T O C R I T E R I O N A (1) , i . e . , t h e p e r s o n e x p e r i e n c e d ,
w i t n e s s e d , o r w a s c o n f r o n t e d w i t h a n e v e n t o r e v e n t s t h a t
i n v o l v e d a c t u a l o r t h r e a t e n e d d e a t h o r s e r i o u s i n j u r y , o r a t h r e a t
t o t h e p h y s i c a l i n t e g r i t y o f s e l f o r o t h e r s

B r i e f T r a u m a t i c E v e n t

	D e s c r i p t i o n	D a t e (M o n t h / Y r)	A g e
F 1 0 3 a	_____		
F 1 0 3 b	_____		
F 1 0 3 c	_____		
F 1 0 3 d	_____		
F 1 0 3 e	_____		
F 1 0 3 f	_____		

IF ANY EVENTS LISTED: Sometimes traumatic experiences like (TRAUMAS LISTED ABOVE) keep coming back in nightmares, flashbacks, or thoughts that you can't get rid of. Has that ever happened to you?

IF NO: What about being very upset when you were in a situation that reminded you of one of these terrible things?

IF NO TO BOTH OF ABOVE, CHECK HERE _____ and stop the questionnaire

Current PTSD

FOR FOLLOWING QUESTIONS FOCUS ON TRAUMATIC EVENT(S) MENTIONED IN SCREENING QUESTION ABOVE.
A. The person has been exposed to a traumatic event in which both of the following were present:
? = inadequate information   1 =absent or false   2 =sub-threshold   3=threshold or true

1	(1) The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others. If person Scores 1 stop the interview	**?**	**1**	**2**	**3**
2	(2) The person's response involved intense fear, helplessness or horror. IF UNCLEAR: How did you react when (TRAUMA) happened? (Were you very afraid or did you feel helpless or horrified?) If person Scores 1 stop the interview	**?**	**1**	**2**	**3**

B. The traumatic event is persistently re-experienced in one (or more) of the following ways:

3	(1) Did you think about the (TRAUMA) when you didn't want to or did thoughts about the (TRAUMA) come to you suddenly when you didn't want them to?	**?**	**1**	**2**	**3**
4	(2) recurrent distressing dreams of the event	**?**	**1**	**2**	**3**
5	(3) Did you find yourself acting or feeling as if you were back in the situation?	**?**	**1**	**2**	**3**
6	(4) Do you get very upset when something reminded you of the (TRAUMA)?	**?**	**1**	**2**	**3**
7	(5) Did you feel physical symptoms--like breaking out in a sweat, breathing heavily or irregularly, or your heart pounding or racing, when something reminded you of (TRAUMA)?	**?**	**1**	**2**	**3**

Did any of the 5 symptoms in B score 3?

If **no**, code **1** and GO TO *Past PTSD. **1** **3**

If **yes** code **3** and go to C.

C. Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following:

8	(1) Have you made a special effort to avoid thinking or talking about what happened?	**?**	**1**	**2**	**3**
9	(2) Have you stayed away from things or people that reminded you of the (TRAUMA)?	**?**	**1**	**2**	**3**
10	(3) Have you been unable to remember some important part of what happened?	**?**	**1**	**2**	**3**
11	(4) Have you been less interested in doing things that used to be important to you, like seeing friends, reading books or watching TV?	**?**	**1**	**2**	**3**
12	(5) Have you felt distant or cut off from others?	**?**	**1**	**2**	**3**
13	(6) Have you felt "numb" or like you no longer had strong feelings about anything or loving feelings for anyone?	**?**	**1**	**2**	**3**
14	(7) Did you notice a change in the way you think about or plan for the future? (Like you didn't think you would ever have a career, get married, or have children?)	**?**	**1**	**2**	**3**

Are at least three "C" Symptoms coded "3."?

IF no, code 1 and GO TO *Past PTSD **1** **3**

If yes code 3 and go to D

D. Persistent symptoms of increased arousal (not present before the trauma) as indicated by two (or more) of the following:

15	(1) Have you had trouble sleeping? (Such as falling asleep or staying asleep?)	**?**	**1**	**2**	**3**
16	(2) Have you been unusually irritable? What about outbursts of anger?	**?**	**1**	**2**	**3**
17	(3) Have you had trouble concentrating?	**?**	**1**	**2**	**3**

18	(4) Have you been watchful or on guard even when there was no reason to be?	?	1	2	3
19	(5) Have you been jumpy or easily startled, like by sudden noises?	?	1	2	3

Are at least two "D" Symptoms coded "3."?

IF no, code 1 and GO TO *Past PTSD **1** **3**

  If yes code 3 and go to E

E. About how long did these problems last?

20	If less than a month code 1 and GO TO *Past PTSD If more than a month code 3 and go to F	?	1	2	3
21	F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.	?	1	2	3

POSTTRAUMATIC STRESS DISORDER
CRITERIA (A), (B), (C), (D), (E), AND (F)
ARE CODED "3."

No?   GO TO Past PTSD assessment **1** **3**

Yes? The diagnosis is Posttraumatic Stress
Disorder PTSD (do not assess past PTSD)

APPENDIX G

Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-C)

Please select the box which best corresponds to how much you have been bothered by each listed problem *in the last month.*

		[1]	[2]	[3]	[4]	[5]
1	Repeated, disturbing memories, thoughts, or images of a stressful experience from the past	Not at all	A little bit	Moderately	Quite a bit	Extremely
2	Repeated disturbing dreams of a stressful experience from the past	Not at all	A little bit	Moderately	Quite a bit	Extremely
3	Suddenly acting or feeling as if a stressful experience were happening again	Not at all	A little bit	Moderately	Quite a bit	Extremely
4	Feeling very upset when something reminded you of a stressful experience from the past	Not at all	A little bit	Moderately	Quite a bit	Extremely
5	Having physical reactions (heart pounding, trouble breathing, sweating) when something reminded you of a stressful experience from the past	Not at all	A little bit	Moderately	Quite a bit	Extremely
6	Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it	Not at all	A little bit	Moderately	Quite a bit	Extremely
7	Avoid activities or situations because they remind you of a stressful experience from the past?	Not at all	A little bit	Moderately	Quite a bit	Extremely

8	Trouble remembering important parts of a stressful experience from the past	Not at all	A little bit	Moderately	Quite a bit	Extremely
9	Loss of interest in things you used to enjoy	Not at all	A little bit	Moderately	Quite a bit	Extremely
10	Feeling distant or cut off from other people	Not at all	A little bit	Moderately	Quite a bit	Extremely
11	Feeling emotionally numb or being unable to have loving feelings for those close to you	Not at all	A little bit	Moderately	Quite a bit	Extremely
12	Feeling as if your future will somehow be cut short	Not at all	A little bit	Moderately	Quite a bit	Extremely
13	Trouble falling asleep or staying asleep	Not at all	A little bit	Moderately	Quite a bit	Extremely
14	Feeling irritable or having angry outbursts	Not at all	A little bit	Moderately	Quite a bit	Extremely
15	Having difficulty concentrating	Not at all	A little bit	Moderately	Quite a bit	Extremely
16	Being super alert or watchful or on guard	Not at all	A little bit	Moderately	Quite a bit	Extremely
17	Feeling jumpy or easily startled	Not at all	A little bit	Moderately	Quite a bit	Extremely

APPENDIX H

Post-displacement Trauma

U.S. Trauma Questionnaire (USTQ) at Baseline

Please circle "YES" or "NO" for each question to indicate whether or not you have experienced any of the following events since you have arrived in the U.S.

1	Oppressed because of ethnicity, religion, or sect	[1]Yes	[2]No
2	Present while someone searched for people or things in your home	[1]Yes	[2]No
3	Searched arbitrarily	[1]Yes	[2]No
4	Property looted, confiscated, or destroyed	[1]Yes	[2]No
5	Forced to settle in a different part of the country with minimal services	[1]Yes	[2]No
6	Imprisoned arbitrarily	[1]Yes	[2]No
7	Suffered ill health without access to medical care or medicine	[1]Yes	[2]No
8	Suffered from lack of food or clean water	[1]Yes	[2]No
9	Forced to flee your country or place of settlement	[1]Yes	[2]No
10	Expelled from your country based on ancestral origin, religion, or sect	[1]Yes	[2]No
11	Lacked shelter	[1]Yes	[2]No
12	Witnessed the desecration or destruction of religious shrines or places of religious instruction	[1]Yes	[2]No
13	Witnessed the arrest, torture, or execution of religious leaders or important members of tribe	[1]Yes	[2]No
14	Witnessed execution of civilians	[1]Yes	[2]No
15	Witnessed shelling, burning, or razing of residential areas or marshlands	[1]Yes	[2]No
16	Witnessed or heard combat situation (explosions, artillery fire, shelling) or landmine	[1]Yes	[2]No
17	Serious physical injury from combat situation or landmine	[1]Yes	[2]No
18	Witnessed rotting corpses	[1]Yes	[2]No

19	Confined to home because of chaos and violence outside	[1]Yes	[2]No
20	Witnessed someone being physically harmed (beating, knifing etc.)	[1]Yes	[2]No
21	Witnessed sexual abuse or rape	[1]Yes	[2]No
22	Witnessed torture	[1]Yes	[2]No
23	Witnessed murder	[1]Yes	[2]No
24	Forced to inform on someone placing them at risk of injury or death	[1]Yes	[2]No
25	Forced to destroy someone's property	[1]Yes	[2]No
26	Forced to physically harm someone (beating, knifing, etc.)	[1]Yes	[2]No
27	Murder of violent death of family member (child, spouse) or friend	[1]Yes	[2]No
28	Forced to pay for bullet used to kill family member	[1]Yes	[2]No
29	Received the body of a family member and prohibited from mourning them and performing burial rites	[1]Yes	[2]No
30	Disappearance of family member (child, spouse etc.) or friend	[1]Yes	[2]No
31	Kidnapping of family member (child, spouse, etc.) or friend	[1]Yes	[2]No
32	Family member (child, spouse, etc.) or friend taken as hostage	[1]Yes	[2]No
33	Someone informed on you placing you and your family at risk of injury or death	[1]Yes	[2]No
34	Physically harmed (beaten, knifed, etc.)	[1]Yes	[2]No
35	Kidnapped	[1]Yes	[2]No
36	Taken as hostage	[1]Yes	[2]No
37	Heard about frightening, dangerous events that occurred to someone else but that you did not experience yourself	[1]Yes	[2]No
38	Sexually abused or raped	[1]Yes	[2]No
39	Coerced to have sex for survival	[1]Yes	[2]No

USTQ at 1st Follow-Up

Please circle "YES" or "NO" for each question to indicate whether or not you have experienced any of the following events since the last interview.

1	Oppressed because of ethnicity, religion, or sect	[1]Yes	[2]No
2	Present while someone searched for people or things in your home	[1]Yes	[2]No
3	Searched arbitrarily	[1]Yes	[2]No
4	Property looted, confiscated, or destroyed	[1]Yes	[2]No
5	Forced to settle in a different part of the country with minimal services	[1]Yes	[2]No
6	Imprisoned arbitrarily	[1]Yes	[2]No
7	Suffered poor health without access to medical care or medicine	[1]Yes	[2]No
8	Suffered from lack of food and/or clean water	[1]Yes	[2]N
9	Lacked shelter	[1]Yes	[2]No
10	Serious physical injury from personal assault	[1]Yes	[2]No
11	Confined to home because of chaos and violence outside	[1]Yes	[2]No
12	Witnessed someone being physically harmed (beating, knifing etc.)	[1]Yes	[2]No
13	Witnessed sexual abuse or rape	[1]Yes	[2]No
14	Witnessed murder	[1]Yes	[2]No
15	Murder or violent death of family member (child, spouse) or friend	[1]Yes	[2]No
16	Disappearance of family member (child, spouse etc.) or friend	[1]Yes	[2]No
17	Kidnapping of family member (child, spouse, etc.) or friend	[1]Yes	[2]No
18	Family member (child, spouse, etc.) or friend taken as hostage	[1]Yes	[2]No
19	Someone informed on you placing you and your family at risk of injury or death	[1]Yes	[2]No
20	Physically harmed (beaten, knifed, etc.)	[1]Yes	[2]No
21	Kidnapped	[1]Yes	[2]No

22	Heard about frightening, dangerous events that occurred to someone else but that you did not experience yourself	[1]Yes	[2]No
23	Sexually harassed	[1]Yes	[2]No
24	Approached to do an illegal action for money	[1]Yes	[2]No
25	Coerced to do an illegal action for money	[1]Yes	[2]No
26	Have you been arrested?	[1]Yes	[2]No
27	Have you been imprisoned?	[1]Yes	[2]No
28	Have you been in a car accident?	[1]Yes	[2]No
29	Have you been harassed by police?	[1]Yes	[2]No
30	Have you worried about being deported?	[1]Yes	[2]No
31	Have you experienced stress related to your financial situation?	[1]Yes	[2]No
32	Has your electricity, gas or water been turned off?	[1]Yes	[2]No
33	Have you been evicted or had your house foreclosed?	[1]Yes	[2]No
34	Has someone in your direct family (e.g., parents, siblings, spouse, children) had legal troubles (arrested, imprisoned)?	[1]Yes	[2]No
35	Has someone in your direct family (e.g., parents, siblings, spouse, children) had serious health problems?	[1]Yes	[2]No
36	Has someone in your direct family (e.g., parents, siblings, spouse, children) had mental health problems?	[1]Yes	[2]No
37	Have you seen a person in the U.S. that was, directly or indirectly, a perpetrator of threats or violence against you or your family in your old country?	[1]Yes	[2]No

USTQ at 2nd Follow-Up

Please circle "YES" or "NO" for each question to indicate whether or not you have experienced any of the following events since the last interview.

1	Oppressed because of ethnicity, religion, or sect	[1]Yes	[2]No
2	Present while someone searched for people or things in your home	[1]Yes	[2]No
3	Searched arbitrarily	[1]Yes	[2]No
4	Property looted, confiscated, or destroyed	[1]Yes	[2]No
5	Forced to settle in a different part of the country with minimal services	[1]Yes	[2]No
6	Imprisoned arbitrarily	[1]Yes	[2]No
7	Suffered poor health without access to medical care or medicine	[1]Yes	[2]No
8	Suffered from lack of food and/or clean water	[1]Yes	[2]No
9	Lacked shelter	[1]Yes	[2]No
10	Serious physical injury from personal assault	[1]Yes	[2]No
11	Confined to home because of chaos and violence outside	[1]Yes	[2]No
12	Witnessed someone being physically harmed (beating, knifing etc.)	[1]Yes	[2]No
13	Witnessed sexual abuse or rape	[1]Yes	[2]No
14	Witnessed murder	[1]Yes	[2]No
15	Murder or violent death of family member (child, spouse) or friend	[1]Yes	[2]No
16	Disappearance of family member (child, spouse etc.) or friend	[1]Yes	[2]No
17	Kidnapping of family member (child, spouse, etc.) or friend	[1]Yes	[2]No
18	Family member (child, spouse, etc.) or friend taken as hostage	[1]Yes	[2]No
19	Someone informed on you placing you and your family at risk of injury or death	[1]Yes	[2]No
20	Physically harmed (beaten, knifed, etc.)	[1]Yes	[2]No
21	Kidnapped	[1]Yes	[2]No
22	Heard about frightening, dangerous events that occurred to someone else but that you did not experience yourself	[1]Yes	[2]No

23	Sexually harassed	[1]Yes	[2]No
24	Approached to do an illegal action for money	[1]Yes	[2]No
25	Coerced to do an illegal action for money	[1]Yes	[2]No
26	Have you been arrested?	[1]Yes	[2]No
27	Have you been imprisoned?	[1]Yes	[2]No
28	Have you been in a car accident?	[1]Yes	[2]No
29	Have you been injured in another type of accident?	[1]Yes	[2]No
30	Have you been harassed by police?	[1]Yes	[2]No
31	Have you worried about being deported?	[1]Yes	[2]No
32	Core family members were unable to join me in the U.S.	[1]Yes	[2]No
33	Have you experienced stress related to your financial situation?	[1]Yes	[2]No
34	Has your electricity, gas or water been turned off?	[1]Yes	[2]No
35	Have you been evicted or had your house foreclosed?	[1]Yes	[2]No
36	Has someone in your direct family (e.g., parents, siblings, spouse, children) had legal troubles (arrested, imprisoned)?	[1]Yes	[2]No
37	Has someone in your direct family (e.g., parents, siblings, spouse, children) had serious health problems?	[1]Yes	[2]No
38	Has someone in your direct family (e.g., parents, siblings, spouse, children) had mental health problems?	[1]Yes	[2]No
39	Have you seen a person in the U.S. that was, directly or indirectly, a perpetrator of threats or violence against you or your family in your old country?	[1]Yes	[2]No

APPENDIX I

Daily Hassles

Please circle one response for each problem, indicating the frequency with which you experience the following problems:

How often do you experience the following...	[1]	[2]	[3]	[4]	[5]
1 Problems with your spouse	Almost Never	Rarely	Sometimes	Often	Almost Always
2 Daily money problems	Almost Never	Rarely	Sometimes	Often	Almost Always
3 Problems with your children	Almost Never	Rarely	Sometimes	Often	Almost Always
4 Problems with your parents	Almost Never	Rarely	Sometimes	Often	Almost Always
5 Problems with other relatives	Almost Never	Rarely	Sometimes	Often	Almost Always
6 Problems with safety	Almost Never	Rarely	Sometimes	Often	Almost Always
7 Problems with transportation	Almost Never	Rarely	Sometimes	Often	Almost Always
8 Problems with language	Almost Never	Rarely	Sometimes	Often	Almost Always

		Almost Never	Rarely	Sometimes	Often	Almost Always
9	Problems finding a job					
10	Problems at work (skip if n/a)					

APPENDIX J

Social Support

1	When I feel lonely, there are several people I can talk to.	[1] Strongly Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Strongly Agree
2	There is no one that I feel comfortable talking to about intimate personal problems. (REVERSE)	[1] Strongly Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Strongly Agree
3	I often meet or talk with family or friends.	[1] Strongly Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Strongly Agree
4	There are several different people I enjoy spending time with.	[1] Strongly Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Strongly Agree
5	There is at least one person I know whose advice I really trust.	[1] Strongly Disagree	[2] Disagree	[3] Undecided	[4] Agree	[5] Strongly Agree

APPENDIX K

Chronic Diseases

Please circle one response for each item, indicating whether or not you have any of the following physician diagnosed disorders:

1	High Blood pressure	[1] Yes	[2] No
2	Heart Disease (any type)	[1] Yes	[2] No
3	Headaches	[1] Yes	[2] No
4	High Cholesterol	[1] Yes	[2] No
5	Sleep apnea or narcolepsy	[1] Yes	[2] No
6	Asthma	[1] Yes	[2] No
7	Diabetes	[1] Yes	[2] No
8	Arthritis or rheumatism	[1] Yes	[2] No
9	Any disease of the muscles or tendons	[1] Yes	[2] No
10	Any skin problems	[1] Yes	[2] No
11	Ear, nose, and throat disorders	[1] Yes	[2] No
12	Cancer (of any type)	[1] Yes	[2] No

APPENDIX L

Sleep Apnea

Please check the most appropriate answer for the following questions.

1 <u>Do you snore?</u> (if no, skip remaining questions)

2 <u>Snoring loudness</u>

   [1] As loud as breathing   [2] As loud as talking

   [3] Louder than talking   [4] Very loud

3 <u>Snoring frequency</u>

   [1] Almost never   [2] 1-2 times per month   [3] 1-2 times per week

   [4] 3-4 times per week   [5] Almost everyday

4 <u>When you sleep, do you ever have pauses in your breathing?</u>

   [1] Never   [2] Almost never   [3] 1-2 times per month   [4] 1-2 times per week

   [5] 3-4 times per week   [6] Almost everyday

5 <u>Are you tired after sleeping?</u>

   [1] Almost never   [2] 1-2 times per month   [3] 1-2 times per week

   [4] 3-4 times per week   [5] Almost everyday

6 <u>Are you tired during wake time?</u>

   [1] Almost never   [2] 1-2 times per month   [3] 1-2 times per week

   [4] 3-4 times per week   [5] Almost everyday

APPENDIX M

LISREL Syntax Study 1 Hypothesis 2

Title: Model 1 Study 1
Group 1: CES1
Observed variables: CES1 CES2 CES3 CES4 CES5 CES6 CES7
Covariance Matrix from file CESTime2CovariancesRegular.txt
Sample size = 281
Latent variables: CES
Equation: CES1 CES2 CES3 CES4 CES5 CES6 CES7= CES
Set the error variance of CES1 free
Set the error variance of CES2 free
Set the error variance of CES3 free
Set the error variance of CES4 free
Set the error variance of CES5 free
Set the error variance of CES6 free
Set the error variance of CES7 free
Group 2: CES2
Covariance Matrix from file CESTime3CovariancesRegular.txt
Sample size = 281
Equation: CES1 CES2 CES3 CES4 CES5 CES6 CES7 = CES
Set the error variance of CES1 free
Set the error variance of CES2 free
Set the error variance of CES3 free
Set the error variance of CES4 free
Set the error variance of CES5 free
Set the error variance of CES6 free
Set the error variance of CES7 free
Lisrel Output: nd=3 all
Path Diagram
End of Problem

Title: Model 2 Study 1
Group 1: CES1
Observed variables: CES1 CES2 CES3 CES4 CES5 CES6 CES7
Covariance Matrix from file CESTime2CovariancesRegular.txt
Sample size = 281
Latent variables: CES
Equation: CES1 CES2 CES3 CES4 CES5 CES6 CES7= CES
Set the error variance of CES1 free
Set the error variance of CES2 free
Set the error variance of CES3 free

Set the error variance of CES4 free
Set the error variance of CES5 free
Set the error variance of CES6 free
Set the error variance of CES7 free
Group 2: CES2
Observed variables: CES1 CES2 CES3 CES4 CES5 CES6 CES7
Covariance Matrix from file CESTime3CovariancesRegular.txt
Sample size = 281
Set the error variance of CES1 free
Set the error variance of CES2 free
Set the error variance of CES3 free
Set the error variance of CES4 free
Set the error variance of CES5 free
Set the error variance of CES6 free
Set the error variance of CES7 free
Lisrel Output: nd=3 all
Path Diagram
End of Problem

Title: Model 3 Study 1
Group 1: CES
Observed variables: CES1 CES2 CES3 CES4 CES5 CES6 CES7
Covariance Matrix from file CESTime2CovariancesRegular.txt
Means
2.32 2.12 2.47 2.56 2.64 2.54 2.72
Sample size = 281
Latent variables: CES
Relationships:
CES1 = CONST + 1*CES
CES2 = CONST + CES
CES3 = CONST + CES
CES4 = CONST + CES
CES5 = CONST + CES
CES6 = CONST + CES
CES7 = CONST + CES
Set the error variance of CES1 free
Set the error variance of CES2 free
Set the error variance of CES3 free
Set the error variance of CES4 free
Set the error variance of CES5 free
Set the error variance of CES6 free
Set the error variance of CES7 free
Set the variance of CES free

Group 2: CES
Covariance Matrix from file CESTime3CovariancesRegular.txt
Means
2.25 2.06 2.46 2.53 2.70 2.43 2.83
Sample size = 281
Relationships:
CES = CONST
Set the error variance of CES1 free
Set the error variance of CES2 free
Set the error variance of CES3 free
Set the error variance of CES4 free
Set the error variance of CES5 free
Set the error variance of CES6 free
Set the error variance of CES7 free
Set the variance of CES free
Lisrel Output: nd=3 all
Path Diagram
End of Problem

Title: Model 4 Study 1
Group 1: CES
Observed variables: CES1 CES2 CES3 CES4 CES5 CES6 CES7
Covariance Matrix from file CESTime2CovariancesRegular.txt
Means
2.32 2.12 2.47 2.56 2.64 2.54 2.72
Sample size = 281
Latent variables: CES
Relationships:
CES1 = CONST + 1*CES
CES2 = CONST + CES
CES3 = CONST + CES
CES4 = CONST + CES
CES5 = CONST + CES
CES6 = CONST + CES
CES7 = CONST + CES
Set the error variance of CES1 free
Set the error variance of CES2 free
Set the error variance of CES3 free
Set the error variance of CES4 free
Set the error variance of CES5 free
Set the error variance of CES6 free
Set the error variance of CES7 free
Set the variance of CES free

Group 2: CES
Covariance Matrix from file CESTime3CovariancesRegular.txt
Means
2.25 2.06 2.46 2.53 2.70 2.43 2.83
Sample size = 281
Relationships:
CES = CONST
Set the variance of CES free
Lisrel Output: nd=3 all
Path Diagram
End of Problem

Title: Model 5 Study 1
Group 1: CES
Observed variables: CES1 CES2 CES3 CES4 CES5 CES6 CES7
Covariance Matrix from file CESTime2CovariancesRegular.txt
Means
2.32 2.12 2.47 2.56 2.64 2.54 2.72
Sample size = 281
Latent variables: CES
Relationships:
CES1 = CONST + 1*CES
CES2 = CONST + CES
CES3 = CONST + CES
CES4 = CONST + CES
CES5 = CONST + CES
CES6 = CONST + CES
CES7 = CONST + CES
Set the error variance of CES1 free
Set the error variance of CES2 free
Set the error variance of CES3 free
Set the error variance of CES4 free
Set the error variance of CES5 free
Set the error variance of CES6 free
Set the error variance of CES7 free
Set the variance of CES free
Group 2: CES
Covariance Matrix from file CESTime3CovariancesRegular.txt
Means
2.25 2.06 2.46 2.53 2.70 2.43 2.83
Sample size = 281
Set the variance of CES free
Lisrel Output: nd=3 all

Path Diagram
End of Problem

Title: Model 6 Study 1
Group 1: CES
Observed variables: CES1 CES2 CES3 CES4 CES5 CES6 CES7
Covariance Matrix from file CESTime2CovariancesRegular.txt
Means
2.32 2.12 2.47 2.56 2.64 2.54 2.72
Sample size = 281
Latent variables: CES
Relationships:
CES1 = CONST + CES
CES2 = CONST + CES
CES3 = CONST + CES
CES4 = CONST + CES
CES5 = CONST + CES
CES6 = CONST + CES
CES7 = CONST + CES
Set the error variance of CES1 free
Set the error variance of CES2 free
Set the error variance of CES3 free
Set the error variance of CES4 free
Set the error variance of CES5 free
Set the error variance of CES6 free
Set the error variance of CES7 free

Group 2: CES
Covariance Matrix from file CESTime3CovariancesRegular.txt
Means
2.25 2.06 2.46 2.53 2.70 2.43 2.83
Sample size = 281
Lisrel Output: nd=3 all
Path Diagram
End of Problem

APPENDIX N

LISREL Syntax Study 3 Hypothesis 1

Title: Model 1 Study 3
Observed variables: PCL21 PCL22 PCL23 PCL24 PCL25 PCL26 PCL27 PCL28 PCL29 PCL210 PCL211 PCL212 PCL213 PCL214 PCL215 PCL216 PCL217 CES21 CES22 CES23 CES24 CES25 CES26 CES27
Covariance Matrix from file Study3Hypothesis1RegularCovarianceMatrix.txt
Sample size = 281
Latent variables: PTSD2 CES2
Equation: CES21 CES22 CES23 CES24 CES25 CES26 CES27= CES2
Set the error variance of CES21 free
Set the error variance of CES22 free
Set the error variance of CES23 free
Set the error variance of CES24 free
Set the error variance of CES25 free
Set the error variance of CES26 free
Set the error variance of CES27 free
Set the variance of CES2 free
Equation: PCL21 PCL22 PCL23 PCL24 PCL25 PCL26 PCL27 PCL28 PCL29 PCL210 PCL211 PCL212 PCL213 PCL214 PCL215 PCL216 PCL217   = PTSD2
Set the error variance of PCL21 free
Set the error variance of PCL22 free
Set the error variance of PCL23 free
Set the error variance of PCL24 free
Set the error variance of PCL25 free
Set the error variance of PCL26 free
Set the error variance of PCL27 free
Set the error variance of PCL28 free
Set the error variance of PCL29 free
Set the error variance of PCL210 free
Set the error variance of PCL211 free
Set the error variance of PCL212 free
Set the error variance of PCL213 free
Set the error variance of PCL214 free
Set the error variance of PCL215 free
Set the error variance of PCL216 free
Set the error variance of PCL217 free
Set the variance of PTSD2 free
Lisrel Output: nd=3 all
Path Diagram
End of Problem

Title: Model 2 Study 3
Observed variables: PCL21 PCL22 PCL23 PCL24 PCL25 PCL26 PCL27 PCL28 PCL29 PCL210 PCL211
PCL212 PCL213 PCL214 PCL215 PCL216 PCL217 CES21 CES22 CES23 CES24 CES25 CES26 CES27
Covariance Matrix from file Study3Hypothesis1RegularCovarianceMatrix.txt
Sample size = 281
Latent variables: PTSD2 CES2 REEXP AVOID HYPER
Equation: CES21 = 1*CES2
Equation: CES22 CES23 CES24 CES25 CES26 CES27= CES2
Set the error variance of CES21 free
Set the error variance of CES22 free
Set the error variance of CES23 free
Set the error variance of CES24 free
Set the error variance of CES25 free
Set the error variance of CES26 free
Set the error variance of CES27 free
Equation: PCL21 = 1*REEXP
Equation: PCL22 PCL23 PCL24 PCL25 = REEXP
Equation: PCL26 = 1*AVOID
Equation: PCL27 PCL28 PCL29 PCL210 PCL211 PCL212 = AVOID
Equation: PCL213 = 1*HYPER
Equation: PCL214 PCL215 PCL216 PCL217 = HYPER
Set the error variance of PCL21 free
Set the error variance of PCL22 free
Set the error variance of PCL23 free
Set the error variance of PCL24 free
Set the error variance of PCL25 free
Set the error variance of PCL26 free
Set the error variance of PCL27 free
Set the error variance of PCL28 free
Set the error variance of PCL29 free
Set the error variance of PCL210 free
Set the error variance of PCL211 free
Set the error variance of PCL212 free
Set the error variance of PCL213 free
Set the error variance of PCL214 free
Set the error variance of PCL215 free
Set the error variance of PCL216 free
Set the error variance of PCL217 free
Equation: REEXP AVOID HYPER = PTSD2
Let the Errors between PTSD2 and CES2 Correlate
Lisrel Output: nd=3 all
Path Diagram
End of Problem

Title: Model 3 Study 3
Observed variables: PCL21 PCL22 PCL23 PCL24 PCL25 PCL26 PCL27 PCL28 PCL29 PCL210 PCL211 PCL212 PCL213 PCL214 PCL215 PCL216 PCL217 CES21 CES22 CES23 CES24 CES25 CES26 CES27
Covariance Matrix from file Study3Hypothesis1RegularCovarianceMatrix.txt
Sample size = 281
Latent variables: TOTALPTSD
Equation: CES21 CES22 CES23 CES24 CES25 CES26 CES27 PCL21 PCL22 PCL23 PCL24 PCL25 PCL26 PCL27 PCL28 PCL29 PCL210 PCL211 PCL212 PCL213 PCL214 PCL215 PCL216 PCL217 = TOTALPTSD
Set the error variance of CES21 free
Set the error variance of CES22 free
Set the error variance of CES23 free
Set the error variance of CES24 free
Set the error variance of CES25 free
Set the error variance of CES26 free
Set the error variance of CES27 free
Set the error variance of PCL21 free
Set the error variance of PCL22 free
Set the error variance of PCL23 free
Set the error variance of PCL24 free
Set the error variance of PCL25 free
Set the error variance of PCL26 free
Set the error variance of PCL27 free
Set the error variance of PCL28 free
Set the error variance of PCL29 free
Set the error variance of PCL210 free
Set the error variance of PCL211 free
Set the error variance of PCL212 free
Set the error variance of PCL213 free
Set the error variance of PCL214 free
Set the error variance of PCL215 free
Set the error variance of PCL216 free
Set the error variance of PCL217 free
Lisrel Output: nd=3 all
Path Diagram
End of Problem

Title: Model 4 Study 2
Observed variables: PCL21 PCL22 PCL23 PCL24 PCL25 PCL26 PCL27 PCL28 PCL29 PCL210 PCL211 PCL212 PCL213 PCL214 PCL215 PCL216 PCL217 CES21 CES22 CES23 CES24 CES25 CES26 CES27
Covariance Matrix from file Study3Hypothesis1RegularCovarianceMatrix.txt
Sample size = 281

Latent variables: PTSD2 CES2 REEXP AVOID HYPER
Equation: CES21 = 1*CES2
Equation: CES22 CES23 CES24 CES25 CES26 CES27= CES2
Set the error variance of CES21 free
Set the error variance of CES22 free
Set the error variance of CES23 free
Set the error variance of CES24 free
Set the error variance of CES25 free
Set the error variance of CES26 free
Set the error variance of CES27 free
Equation: PCL21 = 1*REEXP
Equation: PCL22 PCL23 PCL24 PCL25 = REEXP
Equation: PCL26 = 1*AVOID
Equation: PCL27 PCL28 PCL29 PCL210 PCL211 PCL212 = AVOID
Equation: PCL213 = 1*HYPER
Equation: PCL214 PCL215 PCL216 PCL217 = HYPER
Set the error variance of PCL21 free
Set the error variance of PCL22 free
Set the error variance of PCL23 free
Set the error variance of PCL24 free
Set the error variance of PCL25 free
Set the error variance of PCL26 free
Set the error variance of PCL27 free
Set the error variance of PCL28 free
Set the error variance of PCL29 free
Set the error variance of PCL210 free
Set the error variance of PCL211 free
Set the error variance of PCL212 free
Set the error variance of PCL213 free
Set the error variance of PCL214 free
Set the error variance of PCL215 free
Set the error variance of PCL216 free
Set the error variance of PCL217 free
Equation: REEXP AVOID HYPER CES2= PTSD2
Lisrel Output: nd=3 all AD=OFF
Path Diagram
End of Problem

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ABSTRACT

**EVENT CENTRALITY AFTER TRAUMA: STABILITY, TRAUMA TYPE, AND
POSTTRAUMATIC STRESS DISORDER**

by

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In order to better understand posttraumatic stress disorder (PTSD) symptoms and PTSD's etiology, researchers have begun examining whether PTSD symptoms are related to the centrality of the traumatic event (i.e., whether the trauma is central to the individual's life story and changes the way he or she views the world). The current study examines the following questions: (1) Is event centrality stable over time? (2) What is the effect of cumulative trauma on event centrality? Additionally, do different types of trauma have different associations with event centrality? and (3) Given its relationship with PTSD, should event centrality be considered a reliable and valid symptom of PTSD, instead of a predictor of PTSD?

These questions were addressed using a sample of 298 newly-arrived Iraqi refugees across three waves of measurement. Results from Study 1 indicate event centrality, as measured by the Centrality of Event Scale (CES), is both internally consistent and likely temporally stable over time. Study 2 results suggest CES and PTSD symptoms function similarly with regards to trauma exposure. Specifically, high cumulative trauma exposure is associated with higher CES scores and the specific trauma of Physical Trauma to the Self is associated with higher CES scores than other trauma types. Study 3 provides statistical support for the use of the CES as a

symptom cluster of PTSD and criterion validity analyses indicate that individuals with high CES

scores report poor overall global functioning across a spectrum of outcomes.

Overall, these results indicate event centrality is a critical component to understanding

the cognitive aspects of PTSD and point toward the nuanced nature of identity, trauma, memory,

and mental health. Additionally, these results suggest the CES may be a valid method of

assessing poor mental health in a population unlikely to disclose mental health concerns.

AUTOBIOGRAPHICAL STATEMENT

A native of North Georgia, Michelle Wright is a Cognitive Psychologist who graduated with honors from Mercer University with a Bachelor of Arts (2007) and with Master of Arts in Psychology from Wayne State University (2011). Michelle has worked in research labs in Macon, Georgia; Seoul, South Korea; and Detroit, Michigan with her research consistently focusing on how a better understanding of cognition can inform other areas of psychology. Michelle looks forward to using her cognitive psychology research experience, including her statistics and methodology training, to make a meaningful difference in the health and well-being of others.