The Dutch version of the Centrality of Event Scale (CES): Associations with negative life events, posttraumatic stress, and depression symptoms in a student population.

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Abstract

Event centrality is defined as the extent to which the memory of a traumatic event forms a reference point for personal identity and the attribution of meaning to other experiences in a person's life. The current study investigated the psychometric properties of the Dutch translation of the Centrality of Event Scale (CES; Berntsen & Rubin, 2006) and its relation with symptoms of Posttraumatic Stress Disorder (PTSD), depression, exposure to traumatic events as defined by DSM-5 trauma criterion A, and negative life events in a student sample (N = 967). An underlying structure of one factor was found. This factor structure was replicated in two additional independent samples. High internal consistency was found for a 6-item CES. CES scores were positively related to symptoms of PTSD and depression, to the DSM-5 trauma criterion A, and the number of negative life events. The CES made a unique contribution to the explained variance in PTSD symptoms when controlling for depression. However, CES scores were unrelated to depression when controlling for PTSD symptoms, suggesting that event centrality might be more typically related to PTSD, and less to depression.

Keywords: Event centrality; autobiographical memory; psychometric properties; PTSD; depression

Introduction

The risk of lifetime exposure to a traumatic event ranges between 50 and 90% (Agorastos, Marmar, & Otte, 2011) after which there is a 5 to 10% risk for developing Posttraumatic Stress Disorder (PTSD; Breslau, 2009; de Vries & Olff, 2009; Frans, Rimmo, Aber, & Fredrikson, 2005; Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). PTSD is characterized by intrusive symptoms (e.g., intrusive memories, distressing dreams, flashbacks), avoidance of stimuli associated with the trauma, negative alterations of cognitions and mood, and increased arousal (Diagnostic and Statistical Manual of Mental Disorders 5 [DSM-5]; American Psychiatric Association [APA], 2013).

According to the cognitive model of PTSD (Ehlers & Clark, 2000) symptoms of PTSD are caused by poor integration of the traumatic event in autobiographical memory, such that the trauma memory leads to a sense of current threat. Negative evaluation of the trauma and its consequences and poor elaboration and contextualization of the event in memory are proposed to contribute to this sense of current threat. These two processes are thereby thought to maintain PTSD (Ehlers & Clark, 2000). Alternatively, Berntsen and Rubin (2006, 2007) propose that distress following a traumatic event is maintained because the trauma remains highly accessible in autobiographical memory due to its distinctiveness and emotional impact. The trauma memory forms a cognitive reference point in the autobiographical knowledge base and thereby influences the interpretation of other experiences and expectations for the future. Both theories (Berntsen & Rubin, 2006, 2007; Ehlers & Clark, 2000) converge on the idea that the individual may start to view other life experiences from a trauma-related perspective. Berntsen and Rubin (2006) explain this as the traumatic memory becoming more central to the individual's life-story and identity, whereas this is explained by the memory being poorly integrated in the Ehlers and Clark (2000) model, in contrast.

Event centrality is typically measured with the Centrality of Event Scale (CES; Berntsen & Rubin, 2006, 2007) with items assessing (1) whether the event is a reference point for other experiences, (2) whether it is viewed as a turning point in the life-story, (3) and whether the event is integrated in personal identity. Berntsen and Rubin (2006, 2007) reported a one-factor structure of the CES with good reliability and significant and positive correlations with PTSD and depression in a student population. In addition, higher CES scores were observed if participants met criteria for probable PTSD according to the PTSD Checklist (PCL), and when the negative event fulfilled criteria for trauma according to DSM-IV (APA, 2000) A2 (individual's response to the traumatic event) but not A1 criterion (definition of the traumatic event).

It has been found that event centrality is positively correlated with PTSD symptoms (e.g., Berntsen & Rubin, 2007; Blix, Solberg, & Heir, 2014; Brown, Antonius, Kramer, Root, & Hirst, 2010; Roland, Currier, Rojas-Flores, & Herrera, 2014), posttraumatic growth (Boals & Schuettler, 2011; Boals, Steward, & Schuettler, 2010), symptoms of depression (Boals, 2014; Newby & Moulds, 2011), social anxiety (Matos, Pinto-Gouveia, & Gilbert, 2013), neuroticism (Ogle, Rubin, & Siegler, 2014; Rasmussen & Berntsen, 2010), disturbed grief (Boelen, 2009, 2012a, 2012b), and persistent pain (Perri & Keefe, 2008), and negatively correlated with physical health and general psychological well-being (Waters, 2014; for a recent review of correlates of event centrality see Gehrt, Berntsen, Hoyle, & Rubin, 2018). Although research has been conducted with a Dutch translation of the CES (Boelen, 2009, 2012a, 2012b; Smeets, Giesbrecht, Raymaekers, Shaw, & Merckelbach, 2010; Wessel et al., 2014) no studies systematically evaluated the psychometric properties of the Dutch CES.

The first goal of the present study was to investigate the factor structure, reliability, and construct and criterion validities of the short version of the Dutch CES (Boelen, 2009). We hypothesized that the Dutch CES would have a one-factor structure and a high internal

consistency (Hypothesis 1), that event centrality would be positively correlated with symptoms of PTSD and depression (Hypothesis 2), that individuals with probable PTSD would report higher CES scores than healthy individuals (Hypothesis 3), and that the CES would have a unique predictive value for symptoms of PTSD and depression when controlling for the shared variance between symptoms of depression and PTSD (Hypothesis 4).

A secondary goal was to test the relation between event centrality and the DSM-5 criterion for traumatic events. Previous studies used the criteria from DSM-IV-TR but these have changed considerably in DSM-5 (for a discussion see Brewin, Lanius, Novac, Schnyder, & Galea, 2009; Friedman, Resick, Bryant, & Brewin, 2011). DSM-IV-TR includes a criterion regarding the definition of a traumatic event (A1), as well as the individual's response to the traumatic event (A2). In DSM-5, criterion A is more explicit with regard to how an individual experienced the traumatic event, and includes the specification of whether the event was experienced directly, witnessed, or experienced indirectly. In addition, criterion A2 has been removed. Berntsen and Rubin (2006) found that CES scores were unaffected by the DSM-IV-TR A1 criterion. As the new DSM-5 trauma criterion A is more in line with the old A1 criterion, we predicted no difference in CES scores between individuals with a history of potentially traumatic experiences according to DSM-5 criterion A and individuals without a trauma history (Hypothesis 5).

The final goal was to explore the relation between negative life events and event centrality. Most research on event centrality has focused on the centrality of one specific traumatic event. However, there is a significant chance that individuals experience more than just one potentially traumatic event (Kessler, Sonnega, Brommet, Huges, & Nelson, 1995), resulting in a higher risk of developing PTSD symptoms (Breslau, Chilcoat, Kessler, & Davis, 1999; Harder, Mutiso, Khasakhala, Burke, & Ndetei, 2012), with higher symptom severity

(Suliman et al., 2009). We therefore predicted that a higher number of negative life events would be positively related to event centrality (Hypothesis 6).

At last, previous studies have found that both gender (Boals, 2010) and age (Boals, Hayslip, Knowles, & Banks, 2012; van der Kaap-Deeder, Vansteenkiste, Van Petegem, Raes, & Soenens, 2016) can have an effect on the event centrality, as well as on the relation between event centrality and trauma related psychopathology (Blix et al., 2014). Therefore, we decided to control for both age and gender when testing our hypotheses.

Method

Participants

Participants were 311 (259 females) Dutch speaking first year psychology students of the KU Leuven, with an average age of 19 years (*SD* = 2.42; range: 17–49), participating in exchange for course credits. Two additional samples, consisting of demographically comparable first year psychology students, were recruited in the same way as the first sample in order to test whether the factor solution obtained in Sample 1 could be replicated. The second sample consisted of 274 students (240 females), with an average age of 19 years (*SD* = 3.47; range: 17–56), and the third sample consisted of 382 students (320 females), with an average age of 18 years (*SD* = 1.75; range: 17–35).

Measures

Dutch Centrality of Event Scale (CES). The Dutch version of the Centrality of Event Scale (CES; Berntsen & Rubin, 2006) translated by Boelen (2009) measures the centrality of a specific life event in the life-story and identity of the respondent. The questionnaire contains seven self-report items with a 5-point Likert scale from 1 (*totally disagree)* to 5 (*totally agree)*. Items are, for example: "I feel that this event has become a central part of my life-story" and "This event was a turning point in my life". Scores on the 7-item CES can range from 7 to 35. The original 7-item CES was found to have an internal consistency of α = .92 in

an American student sample (Berntsen & Rubin, 2006). The CES was administered in all samples.

DSM-5 criterion for trauma. Participants were asked the following question with regard to the event of their most distressing negative memory: 'Were you, during the experience of the event, exposed to actual or threatened death, serious injury, or sexual violence in a direct or indirect way?' (APA, 2013, p. 271). Participants responded with 'yes' or 'no'. This question was administered in Samples 1 and 3.

Posttraumatic Stress Disorder Check List (PCL). The PCL measures PTSD symptoms based on DSM-IV-TR criteria (Weathers, Litz, Herman, Huska, & Keane, 1993). DSM-IV-TR version was used to be able to compare our results with those of Berntsen and Rubin (2006). The PCL is a 17-item questionnaire with items rated on 5-point Likert scales, ranging from 1 (*not at all*) to 5 (*extremely*). The measure includes three subscales: avoidance (e.g., 'Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it'), re-experiencing (e.g., 'Feeling very upset when something reminds you of a stressful experience from the past'), and hyperarousal (e.g., 'Trouble falling or staying asleep'). The PCL was found to have an internal consistency of α = .94 (avoidance, α = .82; re-experiencing, α = .94; hyperarousal, α = .84) in a sample of trauma victims (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Scores on the PCL range from 17 to 85. Following Blanchard et al. (1996), a PCL score of 44 was used as a cut-off to indicate a probable PTSD diagnosis. The PCL was administered in Samples 1 and 3.

Beck Depression Inventory-II (BDI-II). The BDI-II (Beck, Steer, & Brown, 1996) measures depressive symptoms with 21 self-report items, each of which includes four statements. Participants select the statement that best describes how they felt during the past two weeks (item score 0 - 3). Items are, for example, "Sadness: 0) I don't feel sad; 1) I feel sad; 2) I am sad all the time and can't snap out of it; 3) I am so sad and unhappy that I can't

stand it". The Dutch version (Van Der Does, 2002) was found to have an internal consistency ranging between α = .88 (community sample) and .92 (patient sample). Three subscales can be distinguished: somatic, affective, and cognitive symptoms (Beck, Steer, Brown, & Van Der Does, 2002). Scores on the BDI-II can range from 0 to 63. The BDI-II was administered in Samples 1 and 3.

Life Event Scale (LES). The LES assesses the experience of negative life events (Garnefski & Kraaij, 2001). The questionnaire includes 28 negative non-traumatic and potentially traumatic negative life events, such as the individual (or family members) being severely chronically ill, parents' divorce, or the death of a family member. Participants are asked to indicate for each event whether they have experienced the event, and if so, when ('No', 'Yes, before my 16th birthday', 'Yes, between my 16th birthday and a year ago', and 'Yes, less than a year ago'). The LES was used to determine the total number of negative life events, which can result in a maximum total score of 28. The LES was administered in Samples 1 and 3. The average number of reported events was 1.67 (*SD* = 1.85) in Sample 1 and 1.81 (*SD* = 1.89) in Sample 3.

Procedure

Approval for this study was obtained from the Social and Societal Ethics Committee of the KU Leuven (SMEC, reference number s56259). Participants from Samples 1 and 3 were seated in a large computer lab with approximately 15 participants at the same time, one on every other computer (i.e., not immediately beside each other). First, they were asked to read and sign an informed consent form. Then, participants were asked to retrieve a specific memory of their most stressful negative or traumatic experience and to keep this memory in mind while completing the questionnaires. Measures were completed in the following order: CES, PCL, BDI-II, DSM-5 criterion A question, and the LES. Participants were then debriefed. All questionnaires were completed online using Google Forms. In Sample 2,

participants completed the CES before proceeding with the remainder of a different study. None of the other measures included in Samples 1 and 3 (i.e., PCL, BDI-II, DSM-5 criterion A question, and LES) were administered in Sample 2.

Statistical analyses

The dimensionality and factor structure of the 7-item Dutch CES were examined by means of confirmatory factor analyses (CFA) and exploratory factor analyses (EFA) using Mplus WLSMV (Muthén & Muthén, 2017) estimation algorithm advised for ordinal data (e.g., Li, 2016a, 2016b). The model-to-data fit was evaluated using Chi-square test (χ^2), the Root Mean Square Error of Approximation (RMSEA) and the Comparative Fit Index (CFI), with small insignificant χ^2 values, RMSEA values below .08, and CFI values above .95 pointing at adequate model fit (Hooper, Coughlan, & Mullen, 2008; Hu & Bentler, 1999).

Ordinal alpha coefficients were calculated to investigate the internal consistency, which are more appropriate for ordinal response scales as they result in more accurate and reliable coefficients than Cronbach's alpha (Gadermann, Guhn, & Zumbo, 2012). Convergent validity was evaluated by calculating correlations between the CES scores and the PCL total and subscale scores (reliving, avoidance, and hyper-arousal), and the BDI-II total and subscale scores (somatic, affective, and cognitive symptoms). Both Pearson and Spearman correlations are reported due to skewness of the BDI-II and PCL scores. In addition, we report partial correlations, controlling for age and gender. Concurrent criterion validity was determined by examining whether the CES scores were related to a specific outcome. This was determined using an ANCOVA with probable PTSD diagnosis according to the PCL (yes/no) as the between-subjects factor, CES score as the dependent variable, and age and gender as covariates. In addition, criterion validity was determined by linear regression analyses, in order to calculate the unique contribution of the CES scores in the explanation of the variance in PTSD and depression symptom scores while controlling for the overlap in

depression and PTSD symptoms. To test the relationship between event centrality and a history of potentially traumatic events according to DSM-5 criterion, ANCOVAs were conducted with exposure to potential DSM-5 traumatic events (yes/no) as the between-subjects factor, CES score as the dependent variable, and age and gender as covariates. To test the relation between event centrality and multiple negative life events, ANCOVAs were conducted with exposure to negative life events on the LES (none, one, or more than one) as the between-subjects factor, CES score as the dependent variable, and age and gender as covariates.

Factor analyses were conducted in Samples 1, 2, and 3. Validity analyses were conducted in Samples 1 and 3. A probability of $\alpha = .05$ was used to determine statistical significance. Partial eta-squared and Hedge's *g* are reported as effect sizes. Hedge's *g* was preferred over Cohen's *d* because of more accurate small-sample properties, as Hedge's g is based on the sample size weighted pooled standard deviation instead of the population based pooled standard deviation. Validity analyses were conducted using SPSS 22 (IBM Corp., 2013).

Results

Demographic variables

To analyze the possible effect of gender on event centrality, three one way ANOVAs, one in each sample, were conducted with CES scores as the dependent variable, and gender (male, female) as the between-subjects factor. Results indicated that there was no effect of gender on CES scores (see Table 1). To test the effect of age on event centrality, we conducted three linear regression analyses predicting CES scores, with age in the first block and CES scores in the next block. Results indicated that in Sample 3, age significantly predicted CES scores, $\beta = .11$, $t(380) = 2.08$, $p = .04$, and explained 1.1% of the variance, $R^2 = .011$, $F(1, 380) = 4.34$. To further exclude the possible

effect of gender and age on CES scores, both variables were included as covariates in the remaining analyses.

1. Factor structure and internal consistency of the Dutch CES

First, the original one-factor model reported by Berntsen and Rubin (2006) was tested in Sample 1, using the WLSMV estimation algorithm for ordinal data. The results are shown in Table 2. Reasonable to good fit was obtained based on the CFI; however, the RMSEA index and Chi-square test did not show a good fit. The same holds in the other samples. Inspecting the covariance matrix, we discovered a high covariance between Item 5 and Item 7 in all samples (*5 - this event permanently changed my life; 7 - this event was a turning point in my life*). Therefore it was decided to remove one of these items. We refitted the one-factor model in all samples, once without Item 5 and once without Item 7. The latter obtained the best fit in the three samples (see Table 2). Overall, reasonable to good fit was found on both CFI and RMSEA, although in Sample 3, RMSEA was still slightly too high (.10 instead of <.08). Chi-square test values were still high and significant, but this could, however, be ascribed to our large sample sizes. Concerning reliability, the 6-item version of the Dutch CES showed ordinal alpha coefficients of α = .90 (Sample 1), .93 (Sample 2), and .85 (Sample 3), indicating good internal consistency. Scale statistics across the three samples are displayed in Table 1. All further analyses were conducted using the 6-item CES.

2. Correlations with PTSD and depression symptoms

To determine convergent validity, correlations between CES scores and PTSD (PCL) and depression symptoms (BDI-II) were calculated. Means and standard deviations are displayed in Table 3. Correlations are shown in Table 4. Correlations between the CES and PCL (and subscales) were all positive and significant, r = .23 and .37 (all p < .001), as were the correlations between the CES and BDI-II (and subscales), r = .40 and .50 (all p < .001). Correlations between the CES and PCL scores ranged from weak to moderate, and

correlations between CES and BDI-II scores from moderate to strong. These results are in line with our hypothesis, as we expected that event centrality would be significantly and positively correlated with depression and PTSD symptoms.

3. Probable PTSD diagnosis and CES scores

In Samples 1 and 3, 73 (23.5%; Sample 1) and 120 (31. 5%; Sample 3) participants met criteria for probable PTSD based on PCL cut-off score of 44. To investigate whether the presence of probable PTSD was related to event centrality, two one-way ANCOVAs, one in each sample, with CES scores as the dependent variable, PTSD groups (probable PTSD, no PTSD) as the between-subjects factor, and age and gender as covariates was conducted. Participants with probable PTSD had significantly higher CES scores than participants without PTSD, $F(1, 307) = 59.68$, $p < .001$, $g = 1.03$ (Sample 1), and $F(1, 378) = 56.17$, $p < .001$, $g = 0.85$ (Sample 3). Mean scores and standard deviations are shown in Table 5. To conclude, participants meeting criteria for probable PTSD reported higher levels of event centrality than participants without PTSD, which is in line with our hypothesis.

4. Event centrality as a predictor for symptoms of PTSD and depression

Statistics are reported in Table 6. A hierarchical multiple regression analysis predicting PCL scores was conducted with age, gender, and BDI-II scores entered in the first block and CES scores in the second block. The final model showed that CES scores were a significant predictor of PCL scores after controlling for age, gender, and BDI-II scores. Second, a hierarchical multiple regression analysis predicting BDI-II scores was conducted with age, gender, and PCL scores entered in the first block and CES scores in the second block. CES scores were not a significant predictor of BDI-II scores when controlling for age, gender, and PCL scores. In the final model, only PCL scores were a significant predictor of BDI-II scores. To conclude, these results show that event centrality is significantly associated with PTSD symptoms when controlling for depression. However, event centrality is not

significantly associated with depression when controlling for PTSD symptoms. This is not in line with our hypothesis, as we expected that event centrality would be a significant predictor of both PTSD and depression symptoms.

5. Event centrality and trauma according to DSM-5 criterion A

In Samples 1 and 3, 93 (29.9%; Sample 1) and 106 (27.7%; Sample 3) participants reported a potentially traumatic event according to DSM-5 criterion A. Two one-way ANCOVAs were computed, one in each sample, with CES scores as the dependent variable, group (DSM-5 trauma, no DSM-5 trauma) as the between-subjects factor, and age and gender as covariates. In both samples, a significantly higher CES score was found in the DSM-5 trauma group, $F(1, 307) = 18.42$, $p < .001$, $g = 0.53$ (Sample 1), and $F(1, 378) = 4.60$, $p = .03$, $g = 0.29$ (Sample 3), although effect sizes suggest only small to medium effects. Mean scores and standard deviations are shown in Table 6. These results showed that higher levels of event centrality are more likely for individuals who have experienced an event meeting the DSM-5 criterion A for trauma in comparison to individuals who have not experiences such events. These findings are not in line with our hypothesis, as we expected no difference between the two groups.

6. Event centrality and negative life events

Participants were grouped according to the absence, presence of one, or presence of multiple negative life events according to the LES (see Table 4 for group details per sample). Two one-way ANCOVAs, one in each sample, with the CES scores as the dependent variable, LES group (none, one, multiple) as the between-subjects factor, and age and gender as covariates showed significant overall group differences in Sample 1, $F(2, 306) = 23.45$, $p < .001$, $\eta_p^2 = .13$, and in Sample 3, $F(2, 377) = 7.37$, $p = .001$, $\eta_p^2 = .04$.

Mean scores and standard deviations are shown in Table 6. Pairwise comparisons in Sample 1 showed that participants in the group reporting multiple events had significantly

higher CES scores than participants in the groups reporting one event (p = .002, g = 0.52) and no events (p < .001, g = 0.92). A small difference was found between participants reporting one and participants reporting no event (p = .05, g = 0.35). In Sample 3, participants reporting multiple events had significantly higher CES scores than participants reporting no events (p < .001, g = 0.49). No significant differences were found between participants reporting multiple events and one event (p = .53, g = 0.19), or participants reporting one and no events (p = .12, g = 0.31).

These results show that, in general, across the two samples, more negative life events are associated with higher event centrality. This result is partly in line with our hypothesis, where a higher number of negative life events were expected to be associated with higher event centrality of the most distressing negative or traumatic event. There was, however, no specific hypothesis on the difference between none, one, and multiple negative life events.

Discussion

Our first hypothesis was that the Dutch 7-item CES would have a one-factor structure and a high internal consistency (Berntsen & Rubin, 2006; Boelen, 2009, 2012b, 2012a). Although we did find a one-factor model, in line with Berntsen and Rubin (2006), Item 7 needed to be removed for a better fit. The resulting one-factor model with the 6-item CES showed a good fit and a high internal consistency in all three independent student samples.

Theoretically, the one-factor model does not appear to be in line with the theoretical underpinning of event centrality as proposed by Berntsen and Rubin (2006), which suggest that event centrality has three distinguishable aspects (reference point for other experiences, turning point in the life-story, and integration in personal identity). It is possible that three factors can be found with the longer version of the CES, which has 20 items. Robinaugh and McNally (2011) indeed found three factors using the 20-item version of the English

translation of the CES. In a new study, we are currently testing whether three factors can be found in a Dutch translation of the 20-item version of the CES.

The different items of the CES show that individuals may apply appraisals to provide meaning to the traumatic event and its impact. This aligns not only with the Berntsen and Rubin (2006) model but also with the cognitive model of PTSD (Ehlers & Clark, 2000), as well as with findings reported by Schönfeld and Ehlers (2006), showing that posttraumatic appraisals (e.g., 'I have changed for the worse') are associated with aspects of PTSD. Appraisals of event centrality and other posttraumatic cognitions may serve a similar function, as Lancaster, Rodriguez, and Weston (2011) showed that event centrality mediated the relationship between posttraumatic cognitions and PTSD symptoms, and posttraumatic cognitions conversely also mediated the link between event centrality and PTSD symptoms.

In line with our second hypothesis, correlations among event centrality and symptoms of PTSD and depression in our sample were similar to those reported by Berntsen and Rubin (2006). Moreover, participants with probable PTSD according to the PCL cut-off score reported higher CES scores (Hypothesis 3). These results suggest that there is a reliable relation between event centrality of a negative life event and symptoms of PTSD (Barton, Boals, & Knowles, 2013; Berntsen & Rubin, 2006, 2007; Boals, 2010; Brown et al., 2010; Roland et al., 2014).

Regression analyses (Hypothesis 4) further confirmed that event centrality had a unique predictive value for symptoms of PTSD, even after controlling for symptoms of depression. However, contrary to several earlier findings (Berntsen & Rubin, 2006, 2007, Boals, 2010, 2014), but in line with other studies (e.g., Janssen, Hearne, & Takarangi, 2015; Newby & Moulds, 2011) event centrality was not related to depression after controlling for symptoms of PTSD. This might indicate that event centrality is more typically related to PTSD, and less to depression. Moreover, Janssen et al. (2015) suggested that depression

might not be affected by the centrality of a negative event, but by the lack of centrality of positive events. Given these apparent contradictory results, more research is needed into the exact working mechanisms among event centrality in depression, which appears to be less straightforward than the link with PTSD.

We further predicted (Hypothesis 5) that CES scores would be unaffected by the presence of a potentially traumatic event according to the DSM-5 trauma criterion A. In contrast to our expectations, individuals who endorsed this criterion reported higher CES scores. Our results are not in line with the findings of Berntsen and Rubin (2006), who did not find a significant effect of the DSM-IV-TR A1 criterion. These mixed findings are illustrative of the ongoing debate on the importance of the DSM trauma criterion A; it has been questioned whether negative experiences can be objectively classified as traumatic or not. Several studies have shown that not all 'subjective' traumatic events are reported as DSM-congruent (Boals, 2018; Boals & Schuettler, 2009, 2011; Gold, Marx, Soler-Baillo, & Sloan, 2005; Rubin, Boals, & Berntsen, 2008). However, a meta-analysis by Larsen and Pacella (2016) showed that, overall, DSM-congruent events are appraised as significantly more traumatic than DSM-incongruent events, although only with a small effect size, which is similar to our findings. In addition, a recent systematic review by Gehrt et al. (2018) showed that, over 11 studies, a small but positive correlation was found between CES scores and the DSM-IV-TR trauma A1 criterion. The theories of Berntsen and Rubin (2006) and Ehlers and Clark (2000) both emphasize the role of the subjective interpretation of negative experiences. Overall, this is in line with our results, where larger effect sizes were found for the relation between event centrality and PTSD symptoms than for the relation between event centrality and the DSM-5 trauma criterion A.

Our final aim (Hypothesis 6) was to test the relation between event centrality and history of negative life events. In line with our expectations, a higher number of negative life

events was associated with higher centrality of the most negative life event, although the strength of the relation ranged from small to large depending on group. As the groups were comparable on demographic variables, we were not able to identify the specific reason for this. The difference might be caused by the larger sample size and/or lower CES scores in Sample 3. These results is in line with the findings reported by Karam et al. (2014), who showed that experiencing multiple traumatic events was related to more severe symptoms of PTSD. This finding is both theoretically and clinically relevant because it could suggest that negative appraisals of event centrality of a single traumatic experience may result in lower resilience in light of additional traumata. Although, another possibility is that these results could suggest that experiencing multiple negative events might increase the negative appraisals of previous experienced traumatic events. More longitudinal research is needed concerning the association between event centrality and the experience of multiple negative life events, to examine the occurrence and maintenance of event centrality following negative events.

An unexpected result was that in Sample 3, age was a significant predictor of event centrality. This finding is partially in line with earlier studies (Boals et al., 2012; van der Kaap-Deeder et al., 2016), in which mixed results were found concerning the association between age and event centrality. For example, Boals et al. (2012) found that older adults, compared to adolescents, reported lower CES scores; whereas van der Kaap-Deeder et al. (2016) found the opposite with older adults reporting more central memories compared to adolescents. Although our results showed that an increase in age was related to higher event centrality, this was only a small effect (1.1% explained variance). This raises the question whether the observed effect might be the result of our large sample size. In addition, the results could also be caused by the fact that older participants might have experienced more negative life events compared to the younger participants. Consequently, more research is

needed to investigate the link between event centrality and age, while controlling for the number of experienced life events.

There are also limitations in the present study. First, over 30% of our participants did not report a negative life event on the LES. This raises the question which memory they used to answer the CES and PCL items. Although instructions were given to keep the most distressing negative or traumatic memory in mind, there was no control of what this memory was. We suggest that future studies record a brief description of the memory, or only select individuals who endorse at least one item on the LES. Second, the current samples consisted almost exclusively of female psychology students, which limits the generalization of the results to a more heterogeneous community or patient sample. Although we controlled for both age and gender, further research in a more heterogeneous sample is needed to replicate our findings.

To conclude, this study showed good psychometric properties for a 6-item version of the Dutch translation of the CES in a non-clinical (mostly female psychology) student sample. A one-factor model was supported. Higher event centrality was related to higher levels of PTSD symptoms, also when controlling for depression. Event centrality was not associated with depression after controlling for PTSD symptoms and thus appears to have a specific relation with PTSD and/or trauma. Further research is needed to assess the factor structure of the 20-item CES to identify the three theoretical factors of event centrality. Experimental and longitudinal studies are needed to test the causal effect of event centrality in the occurrence and maintenance of PTSD symptoms.

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Table 1:

Scale statistics of event centrality for Samples 1, 2, and 3.

Sample	*M* (*SD*)	Male	Female	Gender difference		Skewness	Kurtosis	Item – total
		M (*SD*)	*M* (*SD*)	*F*	df			correlation
1	19.42 (5.63)	19.77 (5.85)	19.35 (5.60)	.24	1,309	-.21	-.84	.56 - .77
2	18.74 (6.37)	18.06 (7.38)	18.84 (6.23))	.44	1,272	-.22	-.80	.66 - .80
3	18.20 (5.70)	17.79 (5.83)	18.28 (5.67)	.39	1,380	-.34	-.59	.52 - .67

Table 2:

Fit indices for the different factor models for the Dutch version of the Centrality of Event Scale.

Samples	Model	DF	χ^2	RMSEA	CFI
Sample 1	Original model (7 items)	14	105.86***	.15	.98
Sample 2	Original model (7 items)	14	57.52***	.11	.99
Sample 3	Original model (7 items)	14	89.96***	.12	.98
Sample 1	6 items – without item 5	9	74.36***	.15	.98
Sample 2	6 items – without item 5	9	19.83*	.07	.99
Sample 3	6 items – without item 5	9	37.61***	.09	.99
Sample 1	6 items – without item 7	9	21.93**	.07	.99
Sample 2	6 items – without item 7	9	46.64***	.08	.99
Sample 3	6 items – without item 7	9	23.38**	.10	.98

Note. DF = Degrees of Freedom; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3.

Means and standard deviations of PTSD and depressive symptoms, and number of reported negative life events for Samples 1 and 3.

	PCL	BDI-II	LES		
Sample	*M* (*SD*)	*M* (*SD*)	0 (*n*)	1 (*n*)	>1 (*n*)
1	35.49 (12.71)	10.37 (8.77)	33.8% (105)	23.5% (73)	42.8% (133)
3	37.07 (13.44)	11.72 (9.00)	29.3% (112)	24.1% (92)	46.6% (178)

Note. PCL = Posttraumatic Stress Disorder Check List; BDI-II = Beck Depression Inventory II; LES = Life Event Scale.

Table 4.

Pearson, Spearman, and partial correlations for the Dutch version of the CES, PCL, and BDI-II and their subscales.

	CES 6 items					
	Sample 1			Sample 3		
	Pearson	Spearman	Partial	Pearson	Spearman	Partial
PCL	.50	.49	.51	.48	.48	.48
PCL – reliving	.45	.44	.47	.41	.39	.41
PCL – avoidance	.46	.45	.46	.46	.47	.46
PCL – hyper–arousal	.43	.41	.44	.40	.39	.39
BDI-II	.37	.38	.38	.34	.35	.33
BDI-II – somatic	.33	.32	.34	.31	.30	.30
BDI-II – affect	.35	.33	.36	.23	.24	.22
BDI-II – cognitive	.33	.33	.33	.35	.35	.34

Note. All correlations were significant at $p < .001$. PCL = Post-traumatic Stress Disorder Check List; BDI-II = Beck Depression Inventory II; CES = Centrality of Event Scale.

Table 5.

Means and standard deviations for the Dutch version of the CES and its subscales.

	Sample	Potential PTSD		DSM-5 Trauma		LES		
		No	Yes	No	Yes	0	1	>1
CES	1	18.17 (5.42)	23.48 (4.24)	18.54 (5.55)	21.47 (5.30)	16.96 (5.20)	18.89 (5.78)	21.65 (5.00)
	3	16.79 (5.66)	21.29 (4.43)	17.75 (5.79)	19.39 (5.29)	16.52 (5.50)	18.20 (5.47)	19.26 (5.71)

Note. Standard deviations are noted between brackets. CES = Centrality of Event Scale; LES = Life Event Scale.

Table 6.

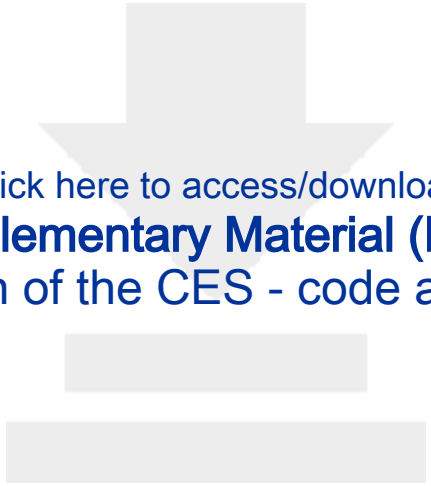
Results of the regression analyses testing the prediction of PTSD symptoms (top half) and depressive symptoms (bottom half).

		6-item CES					
		ΔR^2	*F*change	*B*	*SE*	β	*t*
Prediction of PTSD symptoms							
S1	Gender			2.91	1.35	.09	2.16*
	Age			-0.25	0.21	-.05	-1.23
	Depressive symptoms	.46	87.81***	0.81	0.06	.56	13.07***
	Event centrality	.07	46.50***	0.67	0.10	.30	7.05***
S3	Gender			-0.49	1.25	-.001	-.04
	Age			0.30	0.27	.04	1.14
	Depressive symptoms	.51	128.67***	.1	.05	.61	16.84***
	Event centrality	.06	55.90***	.64	.09	.27	7.48***
Prediction of depressive symptoms							
S1	Gender			.82	1.00	.04	0.83
	Age			.28	.15	.08	1.81
	PTSD symptoms	.46***	87.71***	.46	.03	.67	15.80***
	Event centrality	.00	.002	.08	.08	.05	1.02
S3	Gender			.37	.90	.02	.41
	Age			.17	.19	.03	.87
	PTSD symptoms	.50*	127.64***	.47	.03	.70	19.17***
	Event centrality	.00	.00	.00	.07	.00	-.01

Note. S = Sample; PTSD = Posttraumatic Stress Disorder; CES = Centrality of Event Scale.

* $p < .05$** $p < .01$***$p < .001$;

ESM - codes and output



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Supplementary Material (ESM)

Dutch version of the CES - code and output.zip