Investigating Differences in Truthful and Fabricated Symptoms of Traumatic Stress over Time

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Abstract False allegations of victimization typically are accompanied by malingered emotional symptomology to corroborate claims. This analog study was designed to compare truthful and fabricated symptom profiles on measures of post-traumatic stress (i.e., Revised Impact of Event Scale, Post-Traumatic Stress Disorder (PTSD) Checklist, Trauma Symptom Inventory) and levels of symptom consistency over time. Participants (undergraduate students) described their mental health symptoms for both traumas at time 1 (N=291), time 2 (N=252, 3 month), and time 3 (N=181, 6 months). Results indicated that fabricated traumas were associated with inflated symptom profiles. Validity scales were not effective at discerning symptom veracity, although reports could be discriminated somewhat by atypical responding and clinical scales. PTSD symptoms in malingerers also were reported more consistently over time. This research offers applicable information for identifying feigned traumatic stress.

Keywords Trauma symptoms · Malingering · PTSD · Consistency · False allegations

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Symptoms of traumatic stress experienced in the immediate and long-term aftermath of psychological trauma can have profound effects on an individuals' life (Carlson 1997). Victims may experience acute post-traumatic stress symptoms (e.g., difficulties sleeping, concentrating, increased anxiety, fear, depression) and subsequently develop post-traumatic stress disorder (PTSD; Olff et al. 2009). Unfortunately, PTSD symptomology is highly subjective, and its clinical diagnosis relies primarily upon patients' self reports of trauma symptoms (Elhai et al. 2001). As a result, PTSD and other post-traumatic stress symptoms are relatively easy to malinger (e.g., Elhai et al. 2007; Guriel and Fremouw 2003; Iverson and Lange 2006; Kozarić-Kovačić and Borovecki 2005). In forensic contexts, a critical agenda is to discriminate sincere claims from those that are malingered for some type of internal or external gain (e.g., attention, compensation; see Koch et al. 2006; Rogers 2008). Clinicians and legal decision-makers require an awareness of how people report symptoms associated with false allegations of psychological trauma and how to distinguish them from genuine accounts (e.g., Frueh et al. 2000). The purpose of the present study was to address this issue by examining truthful versus false symptom reports over an extended time period.

Studies have estimated that the lifetime prevalence of exposure to any type of trauma is at least 69% (e.g., Resick 2001; Resnick et al. 1993). However, only a small minority (9–15%) of the general population develop PTSD as a result of their traumatic experience (e.g., Kamphuis and Emmelkamp 2005; Long and Elhai 2009; Rosen 1995). That being said, PTSD is typically manifested at higher rates (ranging from 3% to 58%) in certain "at risk" traumatized populations such as combat veterans, victims exposed to mass violence/disaster, and rape/assault victims (e.g., APA 2000; Fairbank et al. 1983).

PTSD symptomology (i.e., reexperiencing, avoidance, and hyperarousal) is often assessed using self-report measures and considered highly susceptible to malingering (e.g., Elhai et al. 2005; Hall and Hall 2007; Kozarić-Kovačić and Borovecki 2005). Although some researchers suggest malingering as a rare phenomenon (e.g., Gerson 2002), others argue that feigned PTSD is not uncommon (e.g., Calhoun et al. 2000; Candel and Merckelbach 2004; Lees-Haley 1992; McGuire 1999). In particular, when litigation is involved, rates of alleged PTSD tend to be disproportionately higher than the prevalence in the general population (Singh et al. 2007). For example, Rosen (1995) found that 19/22 (86%) victims of the Aleutian Enterprise marine disaster reported PTSD symptomology, many of which were involved in civil law suits and had claimed workers' compensation. While definitive prevalence rates for malingered PTSD are not known, Lees-Haley (1997) estimated that as many as 20–30% of individuals involved in litigation to seek monetary compensation could be malingerers. Resnick (1997) found that 40% of individuals who reported being completely disabled as a result of PTSD and who were receiving compensatory benefits showed no sign of disability in reality. Other researchers have argued that falsely reported psychological distress is much more common than these estimates (e.g., Gerson 2002). Is it possible to differentiate malingered reports of traumatic stress from those who are genuinely suffering?

While false claims of injuries and psychological distress have been of interest to clinicians for decades (Rosen 2004), the empirical study of fabricated symptomology has been neglected until recently (Elhai et al. 2005; Geraerts et al. 2006; Koch et al. 2006). Malingering often is defined as the intentional production of symptoms or illness motivated by some type of external incentive (e.g., APA 2000; Singh et al. 2007). Specific to this study, malingering refers to the fabrication of mental health symptoms (and PTSD in particular) associated with traumatic victimization (e.g., Meyer and Deitsch 1996). Many legal cases involving malingering exist based on the principle of "psychological damages" resulting from a traumatic incident (Iverson and Lange 2006). For example, Anna Ayala was charged and arrested in connection with the "finger in the chili" hoax at a Wendy's Restaurant in San Jose, California in April 2005. Prior to her arrest, she had launched a lawsuit against the restaurant chain suing for psychological damages based on a false allegation of trauma and distress (Dornin 2005). As a result, the fabrication of psychological symptoms is a legitimate concern when evaluating reports of distress associated with traumatic experiences, particularly in cases of civil or criminal litigation (e.g., Burges and McMillan 2001; DeClue 2002; Lees-Haley 1989; Rogers 2008). As recommended by the *DSM-IV-TR* (APA 2000), evaluators should carefully appraise the pattern of symptom reporting when a medicolegal context is present (e.g., compensation seeking). Researchers have evaluated the ability of various psychometric tools to accurately detect fabricated symptoms of traumatic stress and PTSD (Rogers 2008), but there remains no "gold standard" measure to date (Guriel and Fremouw 2003; Morel and Marshman 2008).

Researchers have investigated malingering and PTSD in many different populations, including motor vehicle accident survivors (e.g., Blanchard and Hickling 2004), survivors of maritime disasters (e.g., Rosen 1995), workplace accident victims (e.g., Bury and Bagby 2002), PTSD-naïve individuals (e.g., Burges and McMillan 2001), child sexual abuse survivors (e.g., Elhai et al. 2001), personal injury plaintiffs (e.g., Lees-Haley 1992, 1997), and combat veterans (e.g., DeViva and Bloem 2003; Freeman et al. 2008; Frueh et al. 2000; Geraerts et al. 2009). In general, studies have demonstrated that levels of traumatic stress can be successfully fabricated and may be difficult to discern from genuine claims (e.g., Calhoun et al. 2000; Porter et al. 2007). For example, Lees-Haley and Dunn (1994) found that 86% of naïve undergraduates could fabricate a PTSD diagnosis. Similarly, Burges and McMillan (2001) found that 94% of undergraduates could successfully simulate PTSD. These findings indicate that fabricated symptoms of trauma may be difficult to detect relative to truthful symptoms. Lees-Haley (1990) found that scores on the Impact of Event Scale (IES) were highly similar between fabricated and genuine reports. Further, McGuire (2002) compared a trauma group (all of whom had an active compensation claim) with undergraduate students who had not experienced significant trauma in the past year (no trauma group). Students were instructed to complete the IES as though they were in the midst of a compensation claim and were experiencing emotional problems as the result of a traumatic experience. The results demonstrated that it was difficult to differentiate between the trauma and no trauma groups. The only distinguishing feature was an elevated score on the intrusion subscale in the malingerers (McGuire 2002). DeClue (2002) reported a case of a forensic psychological assessment with a 20-year-old male. The client's scores on psychological testing yielded valid profiles and generally were *not* above cutoff levels on measures indicating inconsistent, infrequent, or unusual responding and impression management. Some scholars have argued that validity scales should be used with caution as they produce false positives and cannot reliably distinguish true invalid profiles (e.g., Elhai et al. 2005; Morel and Marshman 2008; Rosen et al. 2006). Further, some populations of PTSD claimants (i.e., combat veterans) often demonstrate overreporting behaviors and inflated profiles that are not necessarily indicative of malingering (e.g., Freeman et al. 2008; Frueh et al. 2000). As such, both the nature of the trauma and the context of the claim are important to consider when assessing symptom levels.

Despite the lack of symptom differences in the above research, other studies have found variations in truthful and fabricated trauma symptoms. Liljequist et al. (1998) compared PTSD symptomology among genuine PTSD sufferers (i.e., war veterans) and a student control sample that was instructed to malinger. They reported a trend where malingerers scored higher than veterans with PTSD on six different clinical scales assessed: depression, schizophrenia, anxiety, somatic complaints, paranoia, and antisocial features. Malingerers also demonstrated highly elevated scores on the Negative Impression Management validity subscale (pointing to the utility of validity scales in assessment measures). Overall, malingerers exaggerated and inflated their reports of psychopathology in an attempt to appear genuinely disordered (Liljequist et al. 1998; see also Hawes and Boccaccini 2009). In their study using the Trauma Symptom Inventory (TSI), Elhai et al. (2005) found that students simulating PTSD scored significantly higher than PTSD patients on their scores for atypical responding, deviant sexual behavior, and tension reduction behaviors. Further, validity measures such as atypical responding were not effective in discriminating malingered from genuine PTSD (Elhai et al. 2005). Lees-Haley (1984) reported that malingerers tend to include contradictory and exaggerated symptoms, as well as "academically correct" symptom descriptions, in their psychological profiles. In studies concerning combat-related PTSD, participants simulating PTSD produced inflated scores on all measures relative to genuine reporting groups (and those not involved in litigation; e.g., Frueh et al. 2005; Geraerts et al. 2009; Morel 2008). Similarly, Lanyon (1996) reported that deceptive individuals deliberately endorse items indicating virtue or extreme adjustment, engage in self-enhancement, random or stereotypical responding, and symptom over-endorsement. Invalid profiles and malingering also have been associated with higher scores on scales measuring atypical responding and other clinical dimensions (e.g., tension reduction behaviors, dissociative experiences; Nye et al. 2006; Rosen et al. 2006). Closely related to the present study was research conducted by Porter et al. (2007) where undergraduate participants provided truthful and fabricated symptoms of trauma. Across all measures of traumatic stress, fabricated symptoms were exaggerated and reported at significantly higher levels than genuine symptoms of trauma. The level of potential PTSD related to truthful traumas in this sample was 28.6%, relative to 50.8% for fabricated traumas. In addition, 82.5% of fabricated profiles on the TSI were classified as valid according to the validity scales (see also Elhai et al. 2005). Interestingly, this "over the top" quality to symptom profiles was not manifest in higher impression management scores, suggesting a level of sophistication in deceptive behavior (Porter et al. 2007).

Ultimately, it appears that symptom profiles for PTSD are subjective and potentially easy to fake, especially when the respondent is knowledgeable about the disorder (e.g., Bury and Bagby 2002; Elhai et al. 2007; Morel 2008). Burges and McMillan (2001) suggested that this is particularly a problem when participants are given standardized self-report checklists, where both trained and naïve malingerers can successfully feign PTSD criteria. For example, Marshman (2001) studied knowledgeable versus naïve malingerers on levels of PTSD symptoms and traumatic stress, finding that 84% of participants who had knowledge about the specific symptoms of PTSD were able to fake the disorder without detection on the TSI and the Post-traumatic Stress Diagnostic Scale, compared to 18% of the naïve malingerers. This suggests that individuals who are educated in traumatic symptomology (or have experienced past trauma themselves) may have an increased ability to evade detection when malingering and can provide symptom reports that appear to be genuine (e.g., Hall and Hall 2007). It is reasonable to assume that even "naïve" undergraduate participants (frequently students in psychology classes) have some knowledge of post-traumatic stress symptoms (e.g., Burges and McMillan 2001).

That being said, malingered profiles should be compared with how post-traumatic stress is reported by trauma victims who are not asked to feign symptoms (Rogers 2008). Reports of trauma exposure, usually collected in combat veteran populations, have been associated with variations in symptom reporting (e.g., Geraerts et al. 2009). For example, Southwick et al. (1997) conducted a prospective examination of memory for combat related trauma experiences in 59 veterans of Operation Desert Storm 1 month and 2 years after their return from war. Results indicated that 88% of veterans provided inconsistent responses to one of 19 items on a combat trauma questionnaire (e.g., "extreme threat to your personal safety," "seeing others killed or wounded"), and 61% changed responses to two or more items. Inconsistencies resulted from both addition of information (e.g., reporting an event at the 2-year interval not previously reported) and errors of omission (e.g., not reporting an event after the 2-year interval that had been previously reported). On the other hand, King et al. (2000) found that retrospective reports of combat experiences by veterans remained moderately consistent over a 2-year period. More recently, Koenen et al. (2007) found that when PTSD symptoms (particularly reexperiencing) were elevated in their sample (Vietnam veterans) over time, reports of combat exposure also were elevated (corresponding to inconsistent reporting over time). While expected that severity of reported post-traumatic stress symptoms will decline over time in nonclinical populations (e.g., Porter et al. 2007; Schiraldi

2000), it also remains unclear as to how genuine and malingered reports differ as a function of time.

The Present Study

Are there discernable characteristics in fabricated symptomology even if standardized measures have labeled them as "valid"? No studies have investigated truthful and fabricated symptoms of trauma on multiple measures over an extended time interval. This research evaluated trauma symptom profiles to determine if real and falsified accounts of trauma can be differentiated based on the patterns of traumatic stress reported. This research also examined the degree to which falsified profiles of PTSD and other types of trauma symptomology can (or cannot) be maintained consistently over time. It was predicted that fabricated symptomology would show a different pattern of reporting relative to truthful traumatic stress. While studies have found few differences between malingerers and genuine victims (e.g., Frueh et al. 2005), other research has demonstrated some (if not small) variations between groups that warrant further investigation (e.g., Liljequist et al. 1998; McGuire 2002; Porter et al. 2007). Specifically, it was hypothesized that fabricated symptomology would be associated with an "over the top" quality. As such, levels of traumatic stress, PTSD, and other clinical symptomology (e.g., depression) would be inflated relative to genuine levels across all time periods. Deceptive claims would not only be exaggerated during the initial phase, but this rate of responding is likely more consistent over time relative to genuine symptoms (which tend to recede with the passage of time).

Method

Participants

Undergraduate students ($N=291$; 58 males, 233 females) participated in this research for course credit or monetary compensation. The mean age of the sample was 19.64 years (SD=2.38) at the initial testing session (time 1). At time 2 ($M=91.44$ days later; SD=12.77), 252 participants were successfully recontacted. At time 3 ($M=72.13$ days after time 2, SD=16.31), 181 participants returned to complete the final phase of the experiment.[1] Participants were self-selected for having experienced a "highly traumatic event

after the age of 16" that could be verified by an external source if necessary, and trauma symptoms were measured at baseline and across each time period (utilizing standardized measures) for comparison purposes.

Measures

Instructions Participants were given instructions regarding the completion of all questionnaires and symptom profiles. Narratives of their traumatic events were collected as part of a larger study on memory and credibility (see Peace and Porter 2010), and participants were told to complete symptoms with respect to the true and fabricated traumas (counterbalanced) they wrote about. For deceptive accounts, they were instructed to pretend as if the "fake trauma" had been experienced and to complete the symptom questionnaires as convincingly as possible. As an added incentive to create plausible fabrications, participants also were told that legal professionals would be assessing their responses to determine their veracity, and if they successfully "faked." they would be rewarded with an additional bonus credit point (see Porter et al. 2007, for further information).

Revised Impact of Event Scale (IES-R) The IES-R (Weiss and Marmar 1997) is a 22-item self-report questionnaire that involves rating the frequency of various cognitive experiences in relation to a traumatic event (e.g., "I tried not to think about it"; "Any reminder brought back feelings about it") on a scale marked 0 (not at all), 1 (rarely), 3 (sometimes), and 5 (often). The IES-R contains three subscales measuring intrusion, avoidance, and hyperarousal. A total score was generated by combining the subscale scores. This provided an assessment of the overall level of impact of an event, with higher scores representing greater impact. This scale has been extensively used with trauma victims (Foa and Rothbaum 1998). Participants were instructed to complete the IES-R with reference only to the psychological impact of their truthful and fabricated traumas they reported on (singular events and not generalized scores of traumatic impact across the lifespan).

Post-Traumatic Stress Disorder Checklist (PCL) The PCL (Weathers et al. 1994) is a 17-item self-report screening questionnaire for the presence of PTSD symptomology. Each item corresponds directly to the *DSM-IV* PTSD criteria of reexperiencing (e.g., "Have you had recurrent distressing dreams about the incident?"), avoidance and numbing (e.g., "Have you tried to avoid thoughts, feelings or conversations associated with the trauma?"), and hyperarousal (e.g., "Have you experienced an exaggerated startle response?"). Participants rated how often they had

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[1] The rate of attrition between times 1 and 2 was 13.4% and 28.1% between times 2 and 3. While our sample size did decrease over time, the longitudinal sample was still sizeable and allowed for powerful statistical comparisons.

experienced the symptoms listed over the past month on a scale of 1 (not at all) to 5 (all the time). The PCL performs well as a screening measure for PTSD (sensitivity 0.79, specificity 0.79), has high reliability and validity, and is widely used in this capacity (e.g., Dobie et al. 2002; Mueser et al. 2001).

TSI The TSI (Brière 1995) is a well-validated 100-item self-report measure of symptomology that consists of two types of measurements: validity scales (atypical response, response level, inconsistent response) and clinical scales (anxious arousal, depression, anger/irritability, intrusive experiences, defensive avoidance, dissociation, sexual concerns, dysfunctional sexual behavior, impaired self-reference, and tension reduction behavior). Participants rated each item in relation to how frequently it had occurred in the 6 months following each specific event, from 0 (has not happened) to 3 (has happened often). Scores also were classified according to severity level when five or more of the ten clinical scales fell within a certain score range: low (deflated/minimized; range under 49), normal (normal range of scores; range 50–65), and high (exaggerated/maximized; range 65+; see TSI scoring manual; Brière 1995). The TSI has been associated with good psychometric reliability (e.g., Brière and Elliott 1997). For our purposes, the TSI provided a comprehensive examination of symptom and validity profiles associated with truthful and fabricated reports of victimization.

Procedure

After reviewing instructions and providing narrative descriptions of truthful and deceptive traumas (see Peace and Porter 2010), participants completed a series of self-report symptom measures pertaining to both of these events (counterbalanced). In particular, they provided ratings of trauma symptomology on the IES-R, the PCL, and the TSI for each event type. The entire procedure took approximately 1.5–2 hours and was the same at both times 2 and 3. This study used a 2 (trauma type: truthful, fabricated) × 3 (testing time: time 1 [T1], time 2 [T2], time 3 [T3]) within-subject repeated measures multivariate design. The within-subject approach used in this study was modeled after key studies on the assessment of narratives of trauma allegations and/or corresponding symptomology (e.g., Caso et al. 2006; Lampinen et al. 2003; Porter and Peace 2007; Porter et al. 2007; Sporer 1997). In addition, we felt that this approach reflects the manner in which individuals are deceptive outside of the experimental context (i.e., using details or schemas from experienced events to generate fabricated events and symptoms).

Results

IES-R The means (and standard deviations) for total and subscale IES-R scores for both truthful and fabricated traumas are presented in Table 1. In addition, we also evaluated the proportions of scores classified according to severity level. Fabricated trauma symptoms were classified as severe for 61.1% of participants at T1, 46.5% at T2, and 44.3% at T3. Severe levels of traumatic stress for truthful traumas at T1 (45.3%), T2 (30.3%), and T3 (28.5%) were significantly lower than those reported for fabricated traumas; T1: $\chi^2=16.26$, $p<0.01$; T2: $\chi^2=52.33$, $p<0.001$; T3: $\chi^2=48.77$, $p<0.001$. To examine possible differences in symptom reports, a 2 (trauma type) × 3 (testing time) repeated measures MANOVA was conducted with IES-R total and subscale scores as the dependent measures. The overall total scores were 42.13 (SE=1.51) for truthful trauma symptoms and 47.84 (SE=1.49) for fabricated symptoms. The MANOVA indicated main effects of trauma type, Wilks' lambda=0.65, $F(3,122)=21.76$, $p<0.001$ ($\eta^2=0.35$), and time, Wilks' lambda=0.59, $F(6,119)=13.77$, $p<0.001$ ($\eta^2=0.41$). There was no trauma type × time interaction, Wilks' lambda=0.95, $F(6,119)=0.96$, $p>0.05$ ($\eta^2=0.05$). Fabricated traumas were associated with higher levels of overall traumatic stress,[2] $F(1,124)=16.27$, $p<0.001$ ($\eta^2=0.12$); avoidance, $M=15.81$, SE=0.54, $F(1,124)=5.29$, $p<0.05$ ($\eta^2=0.04$); and hyperarousal, $M=14.72$, SE=0.54, $F(1,124)=42.65$, $p<0.001$ ($\eta^2=0.26$); relative to truthful traumas, Ms=42.13 (SE=1.51), 14.51 (SE=0.57), and 11.29 (SE=0.55), respectively. In addition, scores for IES-R total, $F(2,248)=51.44$, $p<0.001$ ($\eta^2=0.29$), intrusion, $F(2,248)=48.76$, $p<0.001$ ($\eta^2=0.28$), avoidance, $F(2,248)=27.3$, $p<0.001$ ($\eta^2=0.18$), and hyperarousal, $F(2,248)=38.06$, $p<0.001$ ($\eta^2=0.24$) scales decreased over time similarly for both types of trauma reports (no interaction effect). Pairwise comparisons indicated that total and subscale scores differed from each other at each testing time (all ps<0.01).

PCL The PCL also measured levels of intrusion, avoidance, and hyperarousal, and provided an overall assessment of PTSD (total and subscale scores are presented in Table 2). At T1, 37% of participants met PTSD criteria with respect to their truthful trauma, relative to 61.9% of fabricated claims, $\chi^2=10.57$, $p<0.01$. This pattern continued at T2, $\chi^2=5.35$, $p<0.05$, and T3, $\chi^2=11.49$, $p<0.01$; fabricated reports met PTSD criteria more often than symptoms associated with truthful trauma. A 2 (trauma type) X 3 (time) repeated measures MANOVA was conducted with

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[2] The IES total score grand mean is reported above for both truthful and fabricated symptom reports.

Table 1 Means, standard deviations, and severity category for truthful (TT) and fabricated (FT) traumatic events over times 1, 2, and 3 (T1, T2, T3) for IES-R scores

IES-R scores	TT			FT			Overall means (SE)		Cohen's d
	T1 (n=274)	T2 (n=246)	T3 (n=176)	T1 (n=272)	T2 (n=248)	T3 (n=173)	TT	FT	
Total score	46.55 (16.75)	40.71 (18.17)	38.25 (18.77)	54.13 (16.17)	47.06 (19.28)	44.96 (20.91)	42.13 (1.51)	47.84 (1.49)	0.35
Avoidance subscale	15.56 (6.48)	13.75 (6.83)	13.09 (7.46)	17.70 (6.19)	15.95 (7.25)	14.84 (7.53)	14.51 (0.57)	15.81 (0.54)	0.21
Intrusion subscale	18.16 (7.01)	15.87 (6.70)	15.01 (7.00)	19.62 (6.09)	17.01 (6.84)	16.29 (7.39)	16.33 (0.56)	17.32 (0.54)	0.16
Hyperarousal subscale	12.70 (6.64)	11.06 (6.78)	10.14 (6.79)	16.82 (6.63)	14.30 (7.00)	13.82 (7.36)	11.29 (0.55)	14.72 (0.54)	0.57
% Severity									
Mild (%)	13.2	22.2	27.3	5.1	16.6	19.8	–	–	–
Moderate (%)	41.5	47.4	44.2	33.9	36.9	35.9	–	–	–
Severe (%)	45.3	30.3	28.5	61.1	46.5	44.3	–	–	–

PCL total and subscale scores as the dependent measures. The MANOVA indicated main effects of trauma type, Wilks' lambda=0.71, $F(3,126)=17.38$, $p<0.001$ ($\eta^2=0.29$), time, Wilks' lambda=0.63, $F(6,123) = 11.91$, $p<0.001$ ($\eta^2=0.37$), and a trauma type X time interaction, Wilks' lambda = 0.88, $F(6,123)=2.7$, $p<0.05$ ($\eta^2=0.12$). Overall, fabricated symptoms were associated with higher PCL total, $F(1,128)=37.9$, $p<0.001$ ($\eta^2=0.23$), and subscale scores on intrusion, $F(1,128)=36.56$, $p<0.001$ ($\eta^2=0.22$), avoidance, $F(1,128)=15.95$, $p<0.001$ ($\eta^2=0.11$), and hyperarousal, $F(1,128)=50.8$, $p<0.001$ ($\eta^2=0.28$), relative to truthful symptoms. Each of these scales also decreased, in general, over time (all $ps<0.001$) when collapsed across trauma type. Pairwise comparisons indicated that PCL total scores as well as the intrusion, avoidance, and hyperarousal subscales differed at both times 1 and 2 (all $ps<0.001$), and times 1 and 3 ($ps<0.01$), but not between times 2 and 3 ($ps>0.05$). However, there was a trauma type X time interaction for PCL total scores, $F(2,256)=7.53$, $p<0.01$ ($\eta^2=0.06$), and the avoidance, $F(2,256)=7.67$, $p <0.01$ ($\eta^2=0.06$), and hyperarousal subscales, $F(2,256)=4.71$, $p< 0.05$ ($\eta^2=0.04$). This interaction indicated that lower ratings over time were accounted for by the deterioration of symptoms associated with truthful traumas to a greater extent (overall) than for fabricated symptoms (see Figs. 1a, b, c).

TSI Overall, the majority of TSI profiles were valid at each time period for both truthful (T1: 90.1%, T2: 94.4%, T3: 88.5%) and fabricated (T1: 84.8%, T2: 87.3%, T3: 84.4%) symptom reports. A 2 (trauma type) X 3 (testing time) repeated measures MANOVA was conducted with the TSI clinical scales as the dependent measures[3] (see Table 3). There were main effects of trauma type, Wilks' lambda= 0.66, $F(10,149)=7.52$, $p<0.001$ ($\eta^2=0.34$), and time, Wilks' lambda=0.58, $F(20,139)=5.02$, $p<0.001$ ($\eta^2= 0.42$), but no significant overall interaction between these two factors, Wilks' lambda=0.82, $F(20,139)=1.48$, $p= 0.09$ ($\eta^2=0.18$). Collapsed across time, fabricated levels of symptomology (relative to truthful trauma symptoms) were higher for the following clinical scales: anxious arousal, $F(1,158)=60.27$, $p<0.001$ ($\eta^2=0.28$), anger/irritability, $F(1,158)=9.45$, $p<0.01$ ($\eta^2=0.06$), intrusive experiences, $F(1,158)=46.75$, $p<0.001$ ($\eta^2=0.23$), defensive avoidance, $F(1,158)=20.23$, $p<0.001$ ($\eta^2=0.11$), dissociation, $F(1,158)=18.99$, $p<0.001$ ($\eta^2=0.11$), sexual concerns, $F(1,158)=6.45$, $p<0.05$ ($\eta^2=0.04$), impaired self-

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[3] These scales were anxious arousal (AA), depression (D), anger/irritability (AI), intrusive experiences (IE), defensive avoidance (DA), dissociation (DIS), sexual concerns (SC), deviant sexual behaviour (DSB), impaired self-reference (ISR), and tension reduction behaviour (TRB).

Table 2 Means, standard deviations, and percentages of possible PTSD for truthful (TT) and fabricated (FT) traumatic events over times 1, 2, and 3 (T1, T2, T3) for scores on the PCL

PCL scores	TT			FT			Overall means (SE)		Cohen's d
	T1 (n=290)	T2 (n=250)	T3 (n=179)	T1 (n=289)	T2 (n=244)	T3 (n=179)	TT	FT	
PCL total score	40.39 (13.45)	37.89 (13.87)	36.63 (13.14)	50.31 (14.58)	44.83 (14.92)	44.80 (15.80)	37.79 (1.13)	45.36 (1.19)	0.58
Intrusion subscale	12.89 (4.81)	11.57 (4.62)	11.03 (4.50)	15.77 (4.76)	13.75 (5.00)	13.64 (5.20)	11.62 (0.36)	14.00 (0.39)	0.56
Avoidance subscale	15.60 (6.14)	14.86 (6.18)	14.33 (6.36)	18.83 (6.43)	17.13 (6.02)	16.57 (6.38)	14.66 (0.51)	16.81 (0.48)	0.39
Hyperarousal subscale	12.28 (5.02)	11.51 (5.03)	11.38 (4.60)	15.74 (5.21)	14.14 (5.41)	14.40 (5.81)	11.51 (0.40)	14.55 (0.43)	0.65
% Met PTSD									
YES (%)	37.0	31.2	26.8	61.9	51.0	45.8	–	–	–
NO (%)	63.0	68.8	73.2	38.1	49.0	54.2	–	–	–

reference, $F(1,158)=6.87$, $p<0.05$ ($\eta^2=0.04$), and tension reduction behavior, $F(1,158)=21.15$, $p<0.001$ ($\eta^2=0.12$). In addition, all clinical subscale scores of the TSI decreased over time. Pairwise comparisons indicated that each clinical scale differed at both times 1 and 2 (ps< 0.01), and times 1 and 3 (ps<0.01), but not between times 2 and 3 (ps>0.05). The only exception to this was the dissociation scale, which decreased significantly at all three testing times (T1–T2: $p<0.001$; T2–T3: $p<0.05$; T1–T3: $p<0.001$). This analysis was repeated for the validity scales of the TSI (atypical responding, response level, and inconsistent response; see Table 4). The MANOVA yielded main effects of time, Wilks' lambda=0.82, $F(6,153)=5.71$, $p<0.001$ ($\eta^2=0.18$), and trauma type, Wilks' lambda=0.79, $F(3,156)=14.03$, $p<0.001$ ($\eta^2=0.21$), with no interaction ($p>0.05$). Overall, atypical responding (ATR) differed significantly between truthful and fabricated symptom profiles, $F(1,158)=36.90$, $p<0.001$ ($\eta^2=0.19$). Specifically, fabricated profiles had higher ATR scores ($M=57.26$, SE=0.98) relative to truthful reports ($M=52.63$, SE=0.78) across time. Response level (RL) and inconsistent responding (INC) were not significantly different between trauma reports (ps>0.05). Scores on the ATR and INC validity scales differed at both times 1 and 2 ($p<0.001$ and $p<0.05$, respectively) and times 1 and 3 ($p<0.001$ and $p<0.05$, respectively). Scores for RL (indicating denial or minimization) differed at times 1 and 3 only ($p<0.05$).

To test the ability of the TSI scales (validity and clinical) to discriminate between trauma types, as well as which scales lend the most predictive ability, discriminant function analyses (DFAs) also were conducted on scores at each of times 1, 2, and 3 (using a cutoff of 0.30 or greater as a meaningful predictor, see Tabachnick and Fidell 2001).[4] At time 1, the model was significant, Wilks' lambda=0.85, $\chi^2_{(13)}=87.53$, $p<0.001$. The strongest discriminators were intrusive experiences (0.72), anxious arousal (0.62), atypical responding (0.53), defensive avoidance (0.52), tension reduction behavior (0.35), dissociation (0.34), and sexual concerns (0.31). Each of these scales had higher mean scores for fabricated relative to truthful symptoms (see Tables 3 and 4). The overall discriminability of the TSI at T1 was 66.5% (70.9% truthful; 62.1% fabricated). At time 2, the TSI was able to discriminate between truthful and fabricated narratives at an overall rate of 62.8% (68.8% truthful; 56.7% fabricated), Wilks' lambda=0.88, $\chi^2_{(13)}=61.03$, $p<0.001$. An evaluation of the structure matrix indicated that anxious arousal (0.74), intrusive experiences

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[4] Discriminant function analyses were not performed for IES-R or PCL scores due to their conceptual overlap, as well as the ability of the multivariate analyses to adequately address total and subscale scores as a function of narrative type.
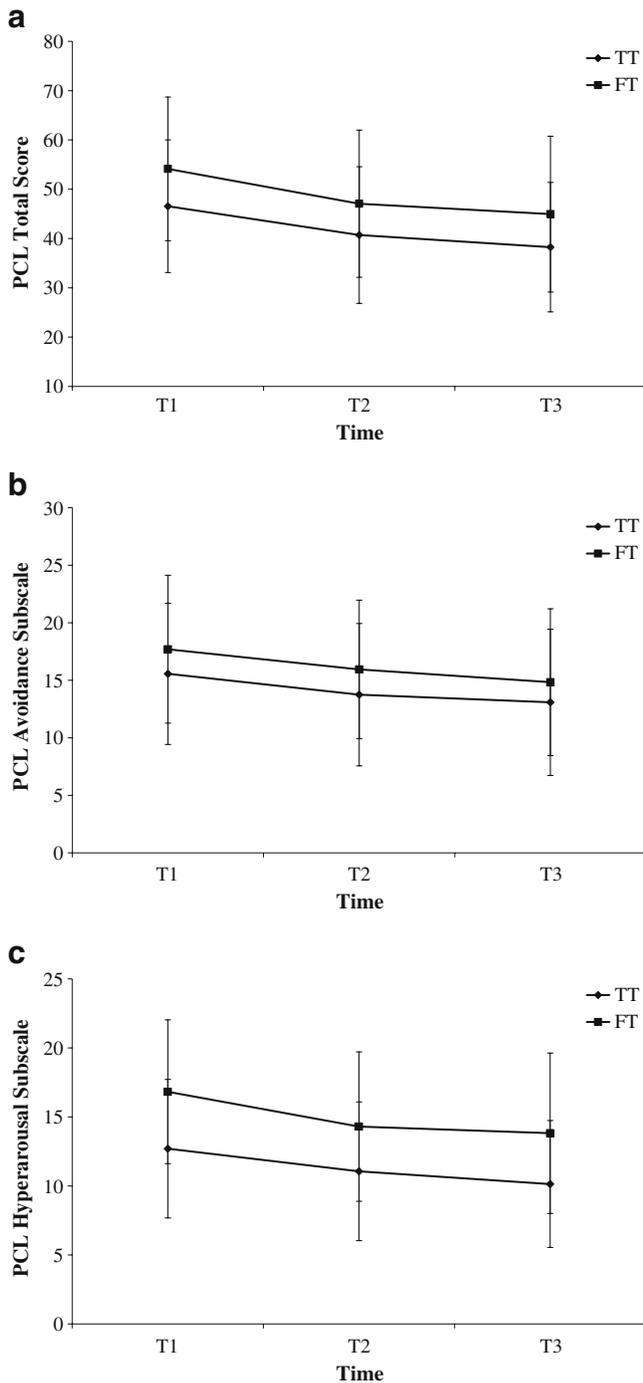
Fig. 1 **a** Mean PCL total scores for truthful (TT) and fabricated (FT) trauma symptoms at times 1, 2, and 3 (T1, T2, T3); **b** mean PCL avoidance scores for truthful (TT) and fabricated (FT) trauma symptoms at times 1, 2, and 3 (T1, T2, T3); **c** mean PCL hyperarousal scores for truthful (TT) and fabricated (FT) trauma symptoms at times 1, 2, and 3 (T1, T2, T3)

(0.60), dissociation (0.48), atypical responding (0.46), defensive avoidance (0.41), and tension reduction behavior (0.40), were able to meaningfully discriminate between traumas (all higher in FTs relative to TTs). At time 3, the

DFA analysis remained significant, Wilks' lambda=0.89, $\chi^2_{(13)}$=39.1, $p<0.001$. Again, elevated levels of anxious arousal (0.70), intrusive experiences (0.60), atypical responding (0.50), tension reduction behavior (0.44), and defensive avoidance (0.34), in fabricated symptom profiles served to meaningfully discriminate these from truthful symptoms. At T3, correct classification of truthful narratives occurred in 70.1% of cases and 56.1% of fabricated cases (overall classification 63.1%).

Discussion

Symptoms of trauma are common, highly subjective, and may be easy to successfully fabricate (e.g., Bury and Bagby 2002; Hall and Hall 2007; McGuire 2002; Morel 2008). Some studies have found few differences between malingerers and genuine victims (e.g., Frueh et al. 2005), whereas others have demonstrated variations between groups that warrant further investigation (e.g., Elhai et al. 2005; Liljequist et al. 1998; McGuire 2002; Morel 2008; Porter et al. 2007; Rosen et al. 2006). It remains unclear as to how symptoms reported in a genuine versus malingered fashion differ in general and over time. As such, it was predicted that fabricated symptomology would be associated with an "over the top" quality. Levels of traumatic stress, PTSD, and other clinical symptomology would be inflated in fabricated relative to truthful reports across all time periods. This prediction was strongly supported by the results of this study. Overall, fabricated traumas were rated as having higher total and subscale mean scores on the IES-R, PCL, and TSI, relative to truthful traumas.[5] This confirms previous research demonstrating "fabrication inflation" (e.g., Elhai et al. 2005; McGuire 2002; Porter et al. 1999; Rosen 2004). However, evaluation of the mean scores indicated that while inflated, these were not exaggerated to such an extent as to appear grossly abnormal (e.g., endorsing five for each symptom on the PCL). For example, on the TSI, mean scores for fabricated traumas were not outside the "normal" range of responding that signifies clinical significance. This may indicate that participants' demonstrated some level of sophistication in their deceptive symptom reports (see Porter et al. 2007; Rosen et al. 2006).

That being said, neither the IES-R nor the PCL has the validity scales that examine patterns of responding to determine the validity of a symptom report whereas the TSI does. Results indicated that of the three TSI validity

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[5] Only two clinical subscales on the TSI were not significantly different between narratives (depression and deviant sexual behavior) despite higher mean scores for fabricated relative to truthful reports.

Table 3 Means and standard deviations for truthful (TT) and fabricated (FT) traumas over times 1, 2, and 3 (T1, T2, T3) for TSI clinical scales

TSI clinical scales	TT			FT			Overall means (SE)		Cohen's d
	T1	T2	T3	T1	T2	T3	TT	FT	
Anxious arousal (AA) [a,b,c]	55.91 (10.06)	52.56 (9.00)	52.77 (9.37)	61.17 (10.46)	57.84 (10.62)	57.64 (10.51)	53.85 (0.67)	59.43 (0.76)	0.62
Depression (D)	55.63 (10.38)	53.30 (9.38)	53.26 (10.02)	56.86 (10.70)	54.88 (10.74)	54.67 (11.13)	54.03 (0.71)	55.25 (0.80)	0.13
Anger/irritability (AI)	56.01 (11.43)	54.39 (10.85)	53.17 (11.10)	58.22 (11.22)	55.98 (10.71)	55.62 (11.55)	54.70 (0.81)	56.42 (0.81)	0.17
Intrusive experiences (IE) [a,b,c]	58.22 (10.26)	55.54 (9.71)	54.78 (10.04)	64.33 (10.43)	60.00 (10.58)	59.18 (11.06)	56.14 (0.72)	61.03 (0.75)	0.53
Defensive avoidance (DA) [a,b,c]	56.68 (9.34)	54.28 (9.10)	53.63 (9.83)	60.57 (9.57)	57.09 (9.50)	55.90 (9.57)	54.87 (0.67)	57.61 (0.65)	0.33
Dissociation (DIS) [a,b]	59.79 (11.64)	56.59 (9.85)	56.05 (12.57)	63.11 (11.84)	60.38 (11.60)	58.03 (13.22)	57.52 (0.79)	60.42 (0.85)	0.28
Sexual concerns (SC) [a]	52.48 (11.59)	50.12 (9.77)	49.79 (10.23)	55.72 (13.64)	52.53 (12.08)	51.97 (12.54)	50.78 (0.78)	52.52 (0.92)	0.16
Dysfunctional sex behavior (DSB)	56.78 (15.55)	54.64 (12.81)	54.54 (13.43)	59.82 (17.66)	57.16 (15.42)	55.05 (14.05)	54.68 (0.96)	55.65 (1.03)	0.08
Impaired self-reference (ISR)	57.10 (10.24)	55.17 (9.42)	54.40 (10.55)	58.78 (10.33)	56.73 (10.31)	55.97 (10.60)	55.48 (0.71)	56.95 (0.74)	0.16
Tension reduction behavior (TRB) [a,b,c]	59.78 (14.35)	57.77 (12.67)	56.24 (12.34)	64.06 (15.44)	61.74 (14.40)	60.19 (13.67)	57.50 (0.86)	60.62 (0.97)	0.27

[a] Discriminated between trauma types at T1

[b] Discriminated between trauma types at T2

[c] Discriminated between trauma types at T3

Table 4 Means, standard deviations, and percentages of endorsement for truthful (TT) and fabricated (FT) traumas over times 1, 2, and 3 (T1, T2, T3) for TSI validity scales

TSI validity scales	TT			FT			Overall means (SE)		Cohen's d
	T1	T2	T3	T1	T2	T3	TT	FT	
Atypical response (ATR) [a,b,c]	55.27 (13.20)	52.56 (10.76)	51.59 (11.18)	61.54 (15.55)	56.90 (14.76)	56.10 (14.53)	52.64 (0.79)	57.39 (0.99)	0.42
Response level (RL)	48.57 (8.45)	49.18 (9.24)	49.71 (10.42)	48.23 (8.54)	49.00 (9.96)	49.53 (10.57)	49.01 (0.62)	48.74 (0.69)	0.03
Inconsistent response (INC)	54.09 (9.80)	52.64 (9.76)	52.65 (9.38)	55.43 (10.37)	54.24 (10.44)	53.17 (9.52)	53.09 (0.53)	53.68 (0.53)	0.09
Valid profiles	90.1% (9.9%)	94.4% (5.6%)	88.5% (11.5%)	84.8% (15.2%)	87.3% (12.7%)	84.4% (15.6%)	–	–	–
Score range									
Low	17.4%	26.0%	32.8%	12.1%	21.2%	23.7%	–	–	–
Normal	50.2%	53.6%	47.7%	40.5%	46.9%	47.4%	–	–	–
High	31.2%	17.6%	17.8%	46.4%	30.7%	26.6%	–	–	–
Dispersed	1.1%	2.8%	1.7%	1.1%	1.2%	2.3%	–	–	–
Endorse unusual symptoms	12.1%	7.2%	6.9%	26.6%	16.7%	15.0%	–	–	–
Minimize behaviors	8.5%	10.0%	11.5%	9.2%	8.2%	9.2%	–	–	–
Inconsistent responding	13.5%	13.2%	10.9%	16.7%	13.1%	11.0%	–	–	–

[a] Discriminated between trauma types at T1

[b] Discriminated between trauma types at T2

[c] Discriminated between trauma types at T3

scales (atypical responding, response level, and inconsistent responding), fabricated symptom reports only were elevated on levels of atypical responding (ATR) relative to truthful reports. The ATR scale measures endorsement of statistically unusual symptomology, and elevations on this scale can occur from patterned and indiscriminate responding (i.e., 2-3-2-3-2) which supports the explanation above. These findings confirm results of past research using the TSI (e.g., Edens et al. 1998; Elhai et al. 2005; Rosen et al. 2006). In addition, research by Nye et al. (2006) suggests that even in clinically diagnosed cases of PTSD, elevations on the ATR subscale were the source of invalid profiles in 89% of such cases (regardless of genuine symptom reports). Overall, the results of the present study indicate that the TSI validity scales were *not* good indicators of the veracity of a report. Of the fabricated reports, the majority were deemed valid profiles (i.e., 84.8% at time 1, 87.3% at time 2, and 84.4% at time 3). In addition, truthful symptom profiles were considered valid 90.1% (time 1), 94.4% (time 2), and 88.5% (time 3) of the time—meaning that some profiles were incorrectly classified as invalid. The danger of such false positives should be taken into account when assessing PTSD and other trauma symptoms using the TSI (see also Elhai et al. 2005; and Rosen et al. 2006). The validity scales appeared better at successfully classifying a truthful report as valid (a true-positive), primarily due to the discriminative power of the ATR validity scale. The strongest clinical predictors were anxious arousal, intrusive experiences, tension reduction behavior, and defensive avoidance. The subtleties of content for these particular scales may have been more difficult for individuals to reliably fabricate relative to scales assessing depression or sexual concerns. Similarly, Nye et al. (2006) reported that invalid profiles were often associated with elevated levels of tension reduction behaviors and dissociative experiences relative to valid profiles. Overall accuracy of the TSI in discriminating between truthful and fabricated reports was 66.5% at time 1, 62.8% at time 2, and 63.1% at time 3. While significantly different than chance levels, sole reliance on the TSI to determine veracity would not be advised (see Efendov et al. 2008; Elhai et al. 2005; Nye et al. 2006; Morel and Marshman 2008; Porter et al. 2007; Rosen et al. 2006).

We also predicted that fabricated symptom reports would be exaggerated and more consistent over time relative to truthful symptoms (whose severity *tend* to recede with the passage of time). This prediction was not supported by the results related to the IES-R and TSI scales. Mean total and subscale scores for these measures decreased over time for both fabricated and truthful traumas. However, scores on the PCL (a direct measure of PTSD) did support this prediction. While all scores decreased over time on this measure, these changed at different rates for truthful and

fabricated traumas. Specifically, PCL total, avoidance, and hyperarousal scores deteriorated to a greater extent (overall) for truthful relative to fabricated symptom reports. This finding is consistent with research that suggests individuals fabricate clinical levels of PTSD to a greater extent and maintain higher levels of symptomology relative to acute (genuine) PTSD symptoms that recede over time (McCann 1998; Olff et al. 2009; Rogers 2008; Schiraldi 2000). It is unclear why this finding was not evidenced for the IES-R scale, which also measures levels of traumatic stress and PTSD symptomology. We argue that the PCL may be more sensitive to the symptoms of PTSD as the *DSM-IV-TR* criteria (APA 2000) are mapped onto this scale (17 items) to directly assesses this disorder, whereas the IES-R (23 items) may contain some extraneous factors that limit the results. Further evaluation and comparison of these (and other) measures of PTSD symptomology in the context of malingering is critical for understanding changes in fabricated symptoms over time (e.g., Morel 2008; Rogers et al. 2005). Certain scales may be more or less sensitive to subtle variations over time in symptom endorsement. Standardized and consistent approaches to deception detection are essential in clinical and forensic contexts (e.g., Koch et al. 2006; McCann 1998; Rogers 2008). While results in this research indicate that fabricated symptomology is inflated, reliable clinical indicators of deceptive symptoms were not found on the measures used in this study.

The present study demonstrated with a large nonclinical sample and longitudinally that symptomology associated with truthful and fabricated narratives of traumatic victimization differs as a function of trauma type and time. In general, fabricated symptoms were inflated on all measures of post-traumatic stress. However, participants demonstrated some measure of sophistication in malingering as reports were not associated with maximum symptom scores. While fabricated symptoms were "over the top," they were not excessively so. Atypical responding on questionnaires was associated to a greater extent with malingered symptomology, as were elevations on several clinical scales (e.g., anxious arousal, defensive avoidance). In addition, direct measures of PTSD were associated with differential changes in symptoms over time, with elevated fabricated symptoms being maintained and genuine symptoms receding. These findings demonstrate that careful consideration of inflated symptoms (and how they are maintained over time) may serve as indicators of possible deception, particularly in assessments of post-traumatic stress disorder. Future research should continue to address various factors associated with truthful and malingered symptom profiles (e.g., individual differences) and the problems associated with the use of so-called validity scales in discerning the veracity of reports. While further research on trauma

symptom profiles is certainly needed, the current findings provide useful information for pinpointing possible false allegations of trauma and psychological distress in clinical and legal settings.

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