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Preliminary Validation of the Traumatic Events Inventory for the Detection of Fictitious Posttraumatic Stress Disorder (PTSD)

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Abstract

Objective*: The present study described the validation of the Traumatic Events Inventory (TEI), a novel self-report measure of Fictitious Posttraumatic Stress Disorder (F-PTSD). The authors hypothesized that the TEI would detect higher sensitivity and specificity of simulating participants compared to traditional measures.*

Methods*: Four groups of volunteers were recruited. The first two groups were comprised of individuals with a self-reported diagnosis of PTSD or depression/anxiety, respectively; the third group was comprised of individuals without a previous mental health history who were instructed to simulate PTSD; the fourth group was individuals without a mental health history who received no instructions. In addition to the TEI, all of the subjects completed the PTSD checklist for DSM-5 and two performance validity tests (PVT): the Reliable Digit Span (RDS), and the Portland Digit Recognition Test (PDRT).*

Results*: The study showed that the TEI possesses high internal consistency and correlates highly with PVT measures. The TEI also has a high classification accuracy for F-PTSD, and its sensitivity and specificity are higher than those of the RDS and PDRT.*

Conclusions*: Our findings support the TEI as a reliable and valid measure for detecting F-PTSD. Future studies are needed to assess the validity of the measure in clinical populations, and its ability to identify subtypes of F-PTSD claimants.*

Introduction

The assessment of Posttraumatic Traumatic Stress Disorder (PTSD) is typically aimed at providing psychological or psychiatric care. However, there is ample evidence of high base rates, ranging from 15% to 64%, of Factitious PTSD (F-PTSD) in various populations (Lees-Haley, 1997; Morel & Shepherd, 2008; Resnick et al., 2018). Therefore, it is important that clinicians employ measures to identify intentionally exaggerated symptoms (Lacoursiere, 1993; Resnick, 1998; Resnick et al., 2018). Resnick (1997) classified three F-PTSD subtypes: (a) patients who have never experienced trauma (pure cases); (b) patients who suffered a trauma and exaggerate their symptoms to obtain an external or emotional reward (partial cases); (c) patients experiencing PTSD symptoms due to an unrelated trauma, yet attributing their symptoms to another event (false imputation) to meet their emotional needs or to attain an external reward.

The ideal measure should be able to assess all three types of F-PTSD. Neuropsychologists currently rely on two types of measures to rule out F-PTSD: symptom validity tests (SVT) and performance validity tests (PVT). SVTs consist of lengthy multiscale questionnaires that include embedded validity scales (Gough, 1947; Guriel-Tennant & Fremouw, 2006; Hathaway & McKinley, 1943; Hunt, 1948; Lange et al., 2010). PVTs identify poor effort. These tests appear difficult, yet are impervious to neurological processes such as early-stage dementia or mild traumatic brain injury (Ashendorf, 2019; Bhowmick et al., 2021; Green et al., 1999; Poreh et al., 2016; Poreh et al., 2017). Repeated studies show that SVTs moderately correlate with PVTs (Copeland et al., 2016; Ruocco et al., 2008). Additionally, using SVTs risks false-negative identification as they may inadvertently capture credible emotional distress (Arbisi & Ben-Porath, 1995; Elhai et al., 2004; Elhai et al., 2002).

The Traumatic Events Inventory (Poreh, 2007) was developed with the assumption that false PTSD claimants exaggerate their premorbid functioning and endorse improbable symptoms (Ashendorf, 2019; Hall & Hall, 2006; Matto et al., 2019). Therefore, the TEI assesses three domains: (a) avoidance behaviors, such as fear of riding a bicycle; (b) impaired daily functioning, such as inability to wash dishes; and (c) unusual symptoms, such as experiencing burning and tingling of the skin. In each of these categories, the TEI embeds both subtle and obvious items. The unique test format allows for the assessment of false imputation and the endorsement of infrequent symptoms. The former domain is assessed using the absolute value (AB) of each question before (B), and after (A), the said trauma.

A separate score was derived using only the sum of responses that were related to symptoms after the event (TEI AF). Finally, a nine-item subscale composed of critical absolute value items (TEI CI-AB) was empirically developed to increase the sensitivity and specificity of the new measure.

In this study, we assessed the incremental validity of the TEI relative to a self-report PTSD measure, the PCL-5 (Blevins et al., 2015), and widely used PVTs, the Reliable Digit Span (Greiffenstein et al., 1994) and the Portland Digit Recognition Test (Binder & Willis, 1991). It was hypothesized that the TEI would yield higher sensitivity and specificity than traditional PVTs, which were originally designed to assess the motivation and feigning of symptoms in patients with minor head trauma.

Methods

Sample

Four groups of volunteers were recruited from across the United States through ResearchMatch.org. Table 1 shows the demographic characteristics of the sample. The first group consisted of volunteers who self-reported a previous diagnosis of PTSD. The second group consisted of volunteers who self-reported a previous diagnosis of anxiety or depression (ANX-DEP). The third group consisted of volunteers without a mental health history who were directed to simulate PTSD symptoms (SIM). The fourth group, a normal control group, was comprised of volunteers without a mental health history who were asked to complete the questionnaire with no additional instructions. The four groups did not differ with regard to sex, $\chi^2(21, 459) = 29.40$, $p = .11$), ethnicity, $\chi^2(42, 459) = 41.30$, $p = .50$), or education, $F(1,7) = 3.51$, $p = .83$). ANOVA did confirm a significant age difference, with the simulators being significantly older than the three other groups, $F(7,485) = 10.37$, $p < .001$. Given the nature of the study, we assumed that this difference had a limited impact on the results.

Table 1
Demographic Characteristics of the Sample

`	PTSD	ANX-DEP	SIM	NORM
Number of subjects	117	130	119	96
Age				
Mean (SD)	44.1 (13.9)	40.6 (15.5)	53.81 (18.4)	40.6 (15.5)
Gender				
% female	79.1	76.9	72.3	53.1
Ethnicity (%)				
African American	4.0	5.4	9.2	8.8
Asian American	1.7	3.1	3.4	2.9
Hispanic/Latino American	5.6	3.1	1.7	7.4
White	81.9	86.9	79.0	73.5
Other	6.8	1.5	6.8	5.9
Education (%)				
High school	9.1	5.4	5.0	3.1
Some college	21.6	25.4	12.6	17.9
Associate's degree	10.2	5.4	9.2	11.9
Bachelor's degree	30.7	41.5	37.0	29.9
Graduate degree	28.4	22.3	29.4	37.3
Trauma (%)				
Lifetime	99.4	80.3	19.2	9.5
Psychotropic Medication %				
> 1	74	71.5	18.5	1.0
Diagnosis (%)				
Psychiatrist	66.7	51.5	10.1	1.0
PCP	5.6	19.2	7.6	
Nurse practitioner	6.3	10.7	0.8	1.0
Psychologist	19.8	15.4	0.8	1.0
Other	.6	2.3	3.4	
Not applicable	1.1	26.2	77.3	96.9
Prescribed medications				
Psychotropic (%)	75.5	73.8	0.0	1.0

Note: PTSD = self-reported post-traumatic stress; ANX/DEP = self-reported anxiety or depression; Simulation = subjects instructed to simulate PTSD; controls = normal controls.

PTSD Checklist for the DSM-5 (PCL-5; Blevins et al., 2015). The PCL-5 is a self-report measure of PTSD symptoms experienced within the past month. The PCL-5 has been found to have strong internal consistency ($\alpha = .94$) and test-retest reliability ($r = .82$).

Reliable Digit Span (RDS). The RDS index (Greiffenstein et al., 1994) is a widely used measure of response bias (Greve et al., 2007). Following Silverstein et al. (2007), a web-based version of the RDS was used. First, participants listened to an audio file consisting of prerecorded strings of digits, read at a pace of one number per second, and were then instructed to type the numbers that they heard. The final score was calculated using the established index.

Portland Digit Recognition Test (PDRT; Binder & Willis, 1991). The PDRT is a forced-choice computerized test that was developed to detect symptom exaggeration. The version used in this study consisted of two blocks of 18 trials, for a total of 36 trials. The first block consists of five-digit strings read at a pace of one digit per second, with a five-second response interval. The second block consists of a 10-second response interval. The equivalence of the computerized version of the PDRT has been demonstrated in previous studies (Rose et al., 1998).

Procedure

The study protocol was approved by the institutional review board of an urban Midwestern university. All participants provided informed consent and completed demographic information forms. Each participant was then assigned to one of the experimental groups according to their self-reported psychiatric history. Following Isinsu (2016) and Guriel-Tennant and Fremouw (2006), the simulation group was given instructions, then they watched a YouTube video to educate them about PTSD. The questionnaires, RDS, and PDRT were administered to all participants in the same order as presented above.

Results

Table 1 shows that the four subject groups differed in age, $F(489, 3) = 15.50$, $p < .001$, $\eta^2 = .09$. Tukey's post-hoc analysis showed that the simulation group was significantly older than the other three groups. The groups did not differ regarding sex, $\chi^2(3) = 12.6$, $p = .18$, ethnicity, $\chi^2(3) = 23.4$, $p = .18$, or level of education, $\chi^2(3) = 21.3$, $p = .27$. Additionally, 74% and 71% of the anxiety/depression and PTSD group members, respectively, reported being prescribed at least one psychotropic medication, while 1% of the control group, and 18.5% of the simulating groups, were prescribed such medication, $\chi^2(3) = 203.30$, $p < .001$. The proportions of participants falling into the PTSD and anxiety/depression groups as diagnosed by a psychiatrist were almost identical.

The self-reported PTSD and anxiety-depression groups reported a higher rate of lifetime trauma than the simulation and control groups, $\chi^2(3) = 82.3$, $p < .001$, as well as a higher number of traumatic events, $F(3, 518) = 46.5$, $p < 0.01$, $\eta^2 = .21$. Tukey's post-hoc analysis indicated that the PTSD group scored significantly higher on the LEC than the anxiety/depression groups (I-J 5.7 to $p < .001$). Table 2 shows that the four groups obtained significantly different scores on the LEC, $F(3) = 19.83$, $p < .001$, $\eta^2 = .14$. Tukey's post-hoc analysis showed that the self-reported PTSD and simulation groups obtained similar scores (I-J = -.30, $p = .89$), as did the anxiety/depression and control groups (I-J = -.17, $p = .99$). Tukey's post-hoc analysis showed that the control and anxiety/depression groups did not significantly differ (I-J = -7.7, $p = 0.39$), and the simulators scored higher than the PTSD group (I-J = -19.7, $p < .001$).

The four groups obtained statistically different scores on the PCL-5, $F(3, 384) = 115.60$, $p < .001$, $\eta^2 = .48$. A post-hoc LSD test showed that the simulator group scored significantly higher

than the other three groups ($p < .001$), and the PTSD group scored significantly higher than the control and anxiety/depression groups ($p < .001$).

Table 2
Mean, Standard Deviation , and Internal Consistency of the Various Measures by Group.

	PTSD *n* = 131	ANX/DEP *n* = 77	Simulation *n* = 101	Controls *n* = 26
LEC	7.62 (2.6)	4.9 (3.1)	7.92 (4.0)	5.1 (2.6)
PCL-5	63.8 (22.3)	47.6 (16.5)	83.5 (13.0)	39.9 (19.2)
RDS	7.95 (2.2)	8.55 (2.0)	5.65 (2.1)	8.9 (2.4)
PDRT	2.02 (2.8)	2.24 (5.0)	8.72 (9.1)	0.70 (1.9)
TEI				
AB 30-item scale	28.80 (14.8)	13.67 (10.2)	53.42 (22.9)	14.73 (10.3)
AF subscale	68.55 (16.6)	55.01 (15.2)	92.59 (19.4)	53.07 (15.4)
CI subscale	4.59 (3.9)	2.10 (2.6)	13.60 (7.78)	2.12 (2.7)
TEI α				
AB 30-item scale	.905	.879	.974	.880
AF 30-item scale	.914	.917	.965	.917
CI AB 9-item subscale	.672	.671	.929	.717

Note: LEC = Life Events Checklist, PCL-5 = PTSD Checklist for the DSM-5, RDS = Reliable Digit Span, PDRT = Portland Digit Recognition Test, TEI = Traumatic Events Inventory, AB = absolute value, AF = after trauma, ANX/DEP = self-reported anxiety or depression group, simulation = subjects who simulated PTSD, controls = normal controls, PTSD = subjects reporting being diagnosed with PTSD.

The four groups ʾperformance on the PDRT was significantly different, $F(3)= 27.88$, $p < .001$, $\eta^2 = .23$. Tukey's post-hoc analysis showed that neither the normal control and anxiety/depression groups (I-J = 1.54, $p = .68$), nor the anxiety/depression and PTSD groups (I-J = -.23, $p = .97$), differed on this measure. However, the SIM group scored higher than the PTSD group (I-J = 6.71, $p < 0.01$). A similar pattern was observed in RDS performance, $F(3) = 580.60$, $p < .001$, $\eta^2 = .27$. Once more, Tukey's post-hoc analysis showed that the control and anxiety/depression groups did not differ on this measure (I-J = 1.05, $p = .99$), nor did the PTSD and anxiety/depression groups (I-J = .60, $p = .21$). This group scored significantly higher than the PTSD group (I-J = 2.30, $p < .001$).

The TEI AB scores of the control and anxiety/depression groups did not significantly differ (I-J = 1.05, $p = .99$), nor did the PTSD and anxiety/depression groups (I-J = -.23, $p = 1.00$). In contrast, the mean scores of the SIM group were higher than the PTSD group (I-J = 6.71, $p < .01$). A similar pattern was found for the TEI AF and CI scales.

Table 3
Results of Stepwise Discriminant Function Analysis

Step		Tolerance	F to Remove	λ	df	Statistic	Sig.
1	TEI AB	1.000	87.25	.692	1,196	87.24	<.001
2	TEI AB	.637	17.849	.654	2,195	51.56	<.001
	PCL-5	.637	11.291				
3	TEI	.585	9.351	.628	3,194	38.34	<.001
	PCL-5	.634	9.521				
	PDRT	.847	8.148				
4	TEI AB	.581	8.039	.614	4,193	30.30	<.001
	PCL-5	.622	7.351				
	PDRT	.801	5.021				
	RDS	.850	4.232				

Note: PCL-5 = PTSD Checklist for the DSM-5, RDS = Reliable Digit Span, PDRT = Portland Digit Recognition Test, TEI = Traumatic Events Inventory, AB = absolute value.

Pearson product-moment correlation showed that the TEI and PCL-5 were highly correlated (r = .77), as were the PCL-5 and RDS (r = .46) and TEI and RD (r = .43). The LEC did not correlate significantly with any of the measures besides the TEI (r = .35). Follow-up discriminant function analysis with the TEI AB, PCL-5, PDRT, and RDS serving as the independent variables, and the PTSD and simulation groups serving as the dependent variables, showed that TEI was the only variable included in the first model. The second model included the PCL-5 (see Table 3).

Table 4 shows the sensitivity and specificity of the TEI CI, AB, AF, PDRT, PCL-5, and RDS scales with self-reported PTSD and simulation subjects as the comparison variable. The TEI CI correctly classified 85% of the simulated subjects and produced the highest area under the curve (AUC). The TEI IC was followed by the TEI AB, TEI AF, PDRT, PCL 5, and RDS, in that order.

Proposed cutoff scores. Table 5 shows the classification accuracy of the *T*-transformed TEI AB scores at selected base rates. A cutoff of T = 80 yielded a positive predictive value PP = .96, and a negative predictive value NPV = .90, at a 30% base rate. It correctly classified all the simulators, but incorrectly identified 13% of the clinical participants, presenting them as demonstrating inadequate effort. The PPV remained relatively stable across various base rate levels. As expected, the proportion of true negative predictions slightly decreased with a lower base rate. Table 6 shows the classification accuracy of the *T*-transformed TEI AF score. A cutoff of 80 and above appears to provide adequate NPV scores.

Table 4
Area Under the Curve Analysis (Binormal Estimation)

Criterion	n	AUC	SE	Z-Value	P-Value	95% Confidence Limits	
						Lower	Upper
TEI CI-AB	198	0.855	0.0503	7.073	0.0000	0.721	0.928
TEI AB	198	0.843	0.0264	13.004	0.0000	0.783	0.888
TEI AF	198	0.822	0.0320	10.056	0.0000	0.749	0.876
PDRT	198	0.759	0.1030	2.515	0.0059	0.476	0.899
PCL-5	198	0.817	0.0302	10.485	0.0000	0.748	0.867
RDS	198	0.738	0.0363	6.571	0.0000	0.659	0.802

Note: AUC = area under the ROC curve using the binormal estimation approach, SE = standard error of the AUC estimate, Z-Value = Z-score for testing AUC > 0.5, P-Value = 1-sided p-value associated with the Z-Value, TEI AB = Traumatic Events Inventory Absolute Value Score, TEI AF = Traumatic Events Inventory After Trauma Score, TEI CI-AB = 9-item Critical Absolute Value Items Score, PCL-5 = PTSD Checklist for the DSM-5, RDS = Reliable Digit Span, PDRT = Portland Digit Recognition Test, TEI = Traumatic Events Inventory, AB = absolute value.

Summary and Conclusions

The results of the study show that the TEI-AB, AF, and CI all correlate highly with traditionally established neurocognitive PVTs. They also correlate with the PCL-5, an established measure of PTSD. This finding demonstrates the complexity of identifying F-PTSD subjects—namely, both F-PTSD and genuine PTSD patients over-report symptoms. However, when using the TEI absolute scores of pre- and post-scores, one can distinguish between simulators and PTSD patients with high confidence.

Table 5
Projected and Actual Classification Accuracy of T-transformed TEI AB Selected Base Rates

Cutoff	SENS	SPEC	FPR	FNR	Youden	PPV Base rate			NPV Base Rate		
						.50	.30	.10	.50	.30	.10
≥ 65.00	0.61	0.97	0.022	0.612	0.3649	0.92	0.95	0.83	0.68	0.77	0.93
≥ 70.00	0.71	0.99	0.007	0.714	0.2781	0.96	0.97	0.91	0.65	0.75	0.92
≥ 75.00	0.79	1.00	0.000	0.796	0.2041	1.00	0.99	0.96	0.62	0.74	0.92
≥ 80.00	0.86	1.00	0.000	0.857	0.1429	1.00	0.99	0.98	0.61	0.73	0.91
≥ 85.00	0.88	1.00	0.000	0.888	0.1122	1.00	0.99	0.99	0.60	0.72	0.91
≥ 90.00	0.93	1.00	0.000	0.939	0.3649	1.00	0.99	0.99	0.59	0.71	0.90

Note: Cutoff score = criterion value range that predicts a positive condition, SENS = Binormal-estimated True Positive Rate or Sensitivity, SPEC = Binormal-estimated True Negative Rate or Specificity, FNR = Binormal-estimated False Negative Rate or Miss Rate, FPR = Binormal-estimated False Positive Rate or Fall-out, Youden Index = Sensitivity + Specificity - 1, PPV = Positive Predictive Value or Precision = A / (A + B), NPV = Negative Predictive Value = D/(C + D).

There are a few notable limitations of the present study. First, the study utilized online performance measures (PVTs) rather than administering the assessments in person. This methodology might not fully replicate an in-person administration. However, as previously noted, the computerized version of the RDS has been found to be as effective at detecting feigned symptoms as the traditional formats (Rose et al., 1995; Silverstein et al., 2007; Woods et al., 2011). Moreover, both the RDS and PDRT adaptation were only used as criterion measures, and if we relied on one-to-one evaluations, the sample size would have decreased significantly.

Table 6
Projected and Actual Classification Accuracy of T-transformed TEI AF Selected Base Rates.

Cutoff	SENS	SPEC	FPR	FNR	Youden	PPV Base rate			NPV Base Rate		
						.50	.30	.10	.50	.30	.10
≤ 65	0.45	0.90	0.82	0.099	0.3514	0.84	0.70	0.37	0.61	0.79	0.93
≤ 70	0.53	0.80	0.710	0.198	0.3363	0.81	0.65	0.33	0.65	0.81	0.94
≤ 75	0.65	0.78	0.689	0.218	0.4310	0.78	0.60	0.28	0.70	0.85	0.95
≤ 80	0.76	0.73	0.635	0.267	0.4960	0.74	0.56	0.24	0.75	0.88	0.96
≤ 85	0.82	0.67	0.572	0.327	0.4977	0.71	0.51	0.21	0.80	0.90	0.97
≤ 90	0.89	0.58	0.482	0.416	0.4697	0.67	0.46	0.18	0.85	0.93	0.98

Note: Cutoff score = criterion value range that predicts a positive condition, SENS = Binormal-estimated True Positive Rate or Sensitivity, SPEC = Binormal-estimated True Negative Rate or Specificity, FNR = Binormal-estimated False Negative Rate or Miss Rate, FPR = Binormal-estimated False Positive Rate or Fall-out, Youden Index = Sensitivity + Specificity - 1, PPV = Positive Predictive Value or Precision = A / (A + B), NPV = Negative Predictive Value = D / (C + D).

Another limitation relates to the composition of the PTSD and anxiety/depression groups. These groups were self-selected, and while most participants reported being diagnosed by a mental health professional, we had no valid way to determine the diagnostic validity. This limitation should be evaluated in the context of large web-based studies. While such studies introduce variance, the ability to collect large samples outweighs this relative limitation.

A final limitation of the present study is the use of a simulator paradigm. The simulating subjects in this study met the definition of pure cases of F-PTSD. As such, it is unclear if the TEI can distinguish between the other PTSD malingering subtypes (Resnick, 1997, 1998; Resnick et al., 2018). As a result, it is very possible that this study represents an overestimation of the TEI's psychometric properties.

In conclusion, this study provides encouraging albeit preliminary data regarding a reliable and valid measure for detecting F-PTSD. Therefore, additional research is necessary, particularly with PTSD subjects not involved in litigation. Only by providing additional cross-validation for these groups might we be able to assess the value of the TEI in detecting F-PTSD subtypes.

Table 7
Classification Accuracy of T-transformed 9-item Critical AB Items Score Selected Base Rates.

Cutoff	SENS	SPEC	FPR	FNR	Youden	PPV Base rate			NPV Base Rate		
						.50	.30	.10	.50	.30	.10
≤ 65	0.74	0.77	0.228	0.260	0.5127	0.80	0.63	0.30	0.70	0.84	0.95
≤ 70	0.78	0.71	0.287	0.221	0.4915	0.78	0.61	0.29	0.77	0.88	0.97
≤ 75	0.83	0.67	0.327	0.168	0.5053	0.77	0.58	0.27	0.83	0.92	0.98
≤ 80	0.87	0.64	0.356	0.130	0.5138	0.74	0.55	0.24	0.89	0.95	0.99
≤ 85	0.93	0.61	0.386	0.069	0.5452	0.72	0.52	0.22	0.93	0.97	0.99
≤ 90	0.95	0.57	0.426	0.046	0.5285	0.69	0.49	0.20	0.96	0.98	1.00

Note: Cutoff score = criterion value range that predicts a positive condition, SENS = Binormal-estimated True Positive Rate or Sensitivity, SPEC = Binormal-estimated True Negative Rate or Specificity, FNR = Binormal-estimated False Negative Rate or Miss Rate, FPR = Binormal-estimated False Positive Rate or Fall-out, Youden Index = Sensitivity + Specificity - 1, PPV = Positive Predictive Value or Precision = A / (A + B), NPV = Negative Predictive Value = D / (C + D).

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