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Over-reporting bias and the Modified Stroop Effect in OEF/OIF Veterans with and without PTSD

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Abstract

The current study investigated in a sample of OEF/OIF Veterans how a symptom over-reporting response style might influence the association between PTSD diagnostic status and color-naming response latency for trauma-related stimuli during the Modified Stroop Task (i.e., the Modified Stroop Task effect, MST effect). It was hypothesized that, if an over-reporting response style reflected feigning or exaggerating PTSD symptoms, an attenuated MST effect would be expected in over-reporters with PTSD as compared with PTSD-diagnosed Veterans without an over-reporting style. If, however, over-reporting stemmed from high levels of distress, the MST effect might be greater in over-reporters compared to those with a neutral response style. The results showed that Veterans with PTSD and an over-reporting response style demonstrated an augmented MST effect in comparison to those with a more neutral style of response. Over-reporters also reported greater levels of psychopathology, including markedly elevated reports of

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dissociative experiences. We suggest that dissociation-prone over-reporters may misattribute emotional distress to combat experiences leading to the enhanced MST effect. Other possible explanations for these results are also discussed.

When survey research methods are utilized, posttraumatic stress disorder (PTSD) prevalence estimates for Veterans returning from recent conflicts in Iraq and Afghanistan have ranged from 4% to 20% (IOM, 2013; Smith et al., 2008). Yet, the rates of PTSD among Department of Veterans Affairs (VA) healthcare users for this war cohort have consistently increased over time such that by 2012 approximately 29% of returning Veterans receiving care in VA healthcare facilities received a PTSD diagnosis (VHA, 2012). PTSD is also the most common service-connected psychiatric condition, and according to a VA OIG report (2005), growth in PTSD claims exceeds that of applications for other disabling conditions. In 2010, approximately 400,000 Veterans received compensation for PTSD, a 222% increase from 1999 (U.S. Department of Veteran Affairs Veterans Benefits Administration, 2010). The dramatic and rapid increase in the rate of diagnosed, service-connected PTSD has intensified longstanding concerns that financial incentives related toVA's disability policies are contributing to over-reporting, and possible fabrication, of PTSD symptoms among some returning Veterans (Frueh et al., 2005; McNally & Frueh, 2012; 2013). Others have countered that evidence of malingering of combat-related PTSD is unclear (Marx et al., 2012).

Adding to the debate about how disability claims impact PTSD reporting is the finding that many Veterans with PTSD acknowledge very uncommon or very unusual symptoms, a presentation style known as "over-reporting," on self-report tests of malingering (Gold & Freuh, 1999; Franklin, Repasky, Thompson, Shelton, & Uddo, 2002; Franklin, Repasky, Thompson, Shelton, & Uddo 2003; Freeman, Powell, & Kimbrell, 2008; Garcia, Franklin, & Chambliss, 2010). For example, Garcia, Franklin, and Chambliss (2010) found that 79% of treatment-seeking Operation Enduring and Iraqi Freedom (OEF/OIF) Veterans with a PTSD diagnosis had elevated scores on over-reporting scales of the Minnesota Multiphasic Personality Inventory II (MMPI-2). Elevated scores were also found on the over-reporting scales of the newly revised MMPI-2 Restructured Form (MMPI-2-RF) in a cross-cohort sample of compensation-seeking Veterans diagnosed with PTSD (Goodwin, Sellbom, & Arbisi, 2013). Though it is now established that an over-reporting response style is frequently observed in PTSD patients, the reasons for this effect remains a contentious topic. Some have suggested that over-reporting should be interpreted as malingering (McNally & Frueh, 2013), though others have suggested that over-reporting reflects a "cry for help" (Garcia, Franklin, & Chamblis, 2010; Guriel & Fremouw, 2003; Hyer, Fallon, Harrison, & Boudewyns, 1987).

This is not only a theoretical debate. There have been instances where evidence of symptom exaggeration has resulted in the revocation of a PTSD diagnosis in military personnel separating from active-duty who filed disability claims for PTSD (Bernton, 2012). Secondary to the contentiousness of the debate and the lack of clear evidence that symptom over-reporting reflects definitive malingering, the Army Surgeon General issued guidelines instructing Department of Defense clinicians not to use response style measures to assist in

determining validity of PTSD claims (H. A. Coley, personal communication, April, 10 2012).

Determining how disability claims impact PTSD reporting and how an "over-reporting" profile should be interpreted is complicated by the lack of any dispositive indicators of dissimulation among those reporting PTSD (Rosen & Taylor, 2007) or any recognized biological or behavioral/cognitive markers of PTSD (National Institute of Medicine, 2006; Yehuda, Neylan, Flory, & McFarlane 2013). There has been, however, a 30-year history of investigating the physiological, neurological, and cognitive correlates of PTSD. One performance-based measure that has shown a large between-group effect for trauma-exposed persons with and without PTSD is the Modified Stroop Task (MST) - a variant of the original Stroop task that requires individuals to color name trauma-relevant and trauma-irrelevant words. Because multiple studies have found that individuals with PTSD are reliably slower in naming the color of trauma-related words relative to trauma-irrelevant words than trauma-exposed controls, (Kaspi, McNally, & Amir, 1995; Litz et al., 1996; McNally, Amir, & Lipke, 1996; McNally, English, & Lipke, 1993; McNally, Kaspi, Riemann, & Zeitlin, 1990; Vrana, Roodman, & Beckman, 1995), some have suggested that the MST may be helpful in determining PTSD diagnostic validity (Sipos et al., 2013).

The potential interest in using the MST to aid diagnostic accuracy is because the MST effect is hypothesized to be an automatic and involuntary allocation of attention to the threat content of the stimulus (i.e., word meaning) rather than the font color, and thus the MST effect should be less vulnerable to manipulation than self-report or clinician-rated measures. To directly test whether PTSD-related MST effect can be purposefully manipulated, Constans, McCloskey, Vasterling, Brailey, and Mathews (2004) offered financial reward to PTSD patients for speeded responses on a MST involving combat words. The investigators found that these patients could not override the color-naming delay for trauma-related words despite financial incentives to do so. To determine if the PTSD-related MST effects could be feigned, Buckley, Galovski, Blanchard, and Hickling (2003) trained actors on PTSD symptom presentation and asked the actors to complete an MST and self-report measures. These investigators found that the actors exhibited elevations of PTSD symptoms on self-report instruments that were similar to elevations observed in actual patients but that the actors could not reproduce the PTSD-related MST effect. Thus, Buckley et al. (2003) suggested that, unlike self-report based assessment, the MST effect is not impacted by feigning of symptoms.

It is unclear, however, how well the Buckley et al. (2003) finding might translate to a real-world setting involving determination of PTSD for post-deployed Veterans. Although the Buckley et al. (2003) finding suggests that the MST could be useful in discriminating between those with legitimate PTSD and those who were complete PTSD dissimulators, it is unclear if the increased rate of combat-related PTSD diagnoses and the association of PTSD with an over-reporting response-style is due to outright malingering. Although some have found evidence of falsified reporting of combat experiences in Veterans seeking PTSD diagnosis in a clinical setting (Freuh et al., 2005), it is unlikely that the increased rates of PTSD and the frequently observed over-reporting response style is entirely due to a complete fabrication of combat experience and post-combat symptoms. Alternate

explanations have been offered to account for the phenomenon of increased reporting of PTSD symptoms and the observation of an "over-reporting" response style, and some have suggested that this over-reporting reflects a process through which an individual intentionally or unintentionally amplifies existing symptoms in an attempt to express legitimate distress (Resnick, 2003). If this alternate explanation is correct, it is possible that over-reporting could actually be associated with an augmentation of the combat MST effect, as a stronger combat MST effect could emerge in over-reporters if the distress was strongly associated with deployment stimuli.

To examine the interrelationship between PTSD, over-reporting response style, and MST performance, Veterans of Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) completed measures of PTSD and test-taking response bias as well as a MST. Participants were categorized into PTSD+ /PTSD− and Over-reporting+/Over-reporting− groups. Color-naming response times for combat and general-threat word stimuli were compared across groups, and we predicted that, similar to the findings with Veterans of other wars, OEF/OIF Veterans with PTSD would show both a combat MST effect and general threat stimuli MST effect. But, of more relevance to the main aims of this study, we also explored possible MST effect differences between Veterans with and without PTSD and with and without over-reporting styles.

Because of the lack of existing data on the relationship between over-reporting and the MST and because of the differing interpretations concerning why over-reporting is observed in Veteran samples, we did not have a clear prediction about how presence of an over-reporting response style might impact MST performance in Veterans with PTSD. We did speculate that, if an over-reporting response style was due to intentional dissimulation, the MST effect likely would be eliminated or attenuated in a sample of PTSD-diagnosed participants who had an exaggerated clinical presentation. That is, based on the results from Buckley et al. (2003), we thought it unlikely that someone who feigns PTSD symptoms could (1) correctly deduce that PTSD is associated with slightly slower responding on combat words and (2) adjust color-naming response time to create the desired MST effect. However, we also recognized that over-reporting might be due to high distress, and if so, it is possible that an over-reporting response style would actually be associated with an even more robust MST effect. This augmenting effect could occur because of the strong negative emotionality associated with word stimuli that is perceived to be the source of the distress (Williams, Mathews, & MacLeod, 1996). Thus, if over-reporting reflects greater distress and deployment stressors are perceived as the source of this distress, over-reporting Veterans with PTSD could potentially show even slower responses to combat-related words than Veterans with PTSD who do not show an over-reporting response style.

Method

Participants

To ensure we included Veterans who were both positive and negative for PTSD diagnosis, we recruited mental health treatment-seeking and non-treatment-seeking Veterans who were deployed to OEF or OIF. Inclusion criteria for both the treatment-seeking and non treatment-seeking sample included age 18 to 60 and OIF or OEF deployment. Exclusion

criteria for the treatment-seeking and non treatment-seeking sample included: current diagnosis of schizophrenia; daily use of benzodiazepines except as needed for sleep; daily use of beta-blockers; plans to leave the area within 6 months; diagnosis of color-blindness by a physician; and inability to recognize the primary colors red, blue, and green. The medication exclusion criteria were included because these participants were also recruited into another study concerning heart rate variability. Of a total of 189 prospective participants, 128 met inclusion and exclusion criteria. One hundred participants were in the treatment seeking group and 28 were non treatment-seeking. Four of the 128 participants did not complete the Stroop task leaving 124 participants who completed all study procedures.

Measures

Assessment of PTSD—The Clinician Administered PTSD Scale (CAPS), a structured interview with superior reliability and validity characteristics (Weathers, Keane, & Davidson, 2001; Weathers, Ruscio, & Keane, 1999), was used to determine PTSD diagnostic status. A DSM-IV diagnosis of PTSD was determined according to the "Rule of Four" decision rules described by Weathers et al. (1999). This decision heuristic considers a symptom to be present only if the frequency ratings and intensity ratings total at least four for any one item. This heuristic was chosen because it most closely approximates diagnosis in clinical practice, therefore increasing the relevance of our findings to clinicians. DSM-IV diagnostic criteria are then used to determine whether the symptom profile meets criteria for PTSD diagnosis (i.e, the individual must have at least one re-experiencing symptom, at least 3 avoidance/numbing symptoms, and at least 2 hyperarousal symptoms). Using this strategy, the investigators categorized participants as either meeting PTSD diagnostic criteria (PTSD +) or not meeting PTSD diagnostic criteria (PTSD−)[1]. In the present study, three separate clinicians administered the CAPS. Inter-rater reliability was excellent (kappa = 1.00 for all but one of the separate frequency and intensity ratings; kappa = 1.00 for PTSD diagnosis).

Self-report measures of psychopathology—To examine whether over-reporting biases extended to measures of psychopathology commonly related to PTSD, participants completed several self-report instruments. The PTSD Checklist-Military Version (PCL-M; Bliese et al., 2008) was used as a self-report measure of PTSD severity. This scale lists the 17 symptoms of PTSD and asks the respondent to rate the severity of each on a scale from 1–5. Higher scores indicate greater post-traumatic stress symptom severity. The PCL-M has strong internal consistency (α=.97) and test-retest reliability (r=.96) as well as excellent convergent and criterion validity (Bliese et al., 2008).

Depressive symptoms were measured using the Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a nine-item scale in which respondents rate the frequency of common depressive symptoms on a scale from 0 to 3. The PHQ-9 can be used as a continuous measure of depression with higher scores corresponding to greater

[1]If PTSD+ participants were required to have a CAPS score greater than 65 in addition to the Rule of Four decision rule (as per the most stringent CAPS coding scheme listed in Weathers, et al., 1999), 13 PTSD+ participants would no longer meet diagnostic criteria. Use of the stringent criteria seemed inappropriate as the mean CAPS severity score for these 13 participants was 54, with only one individual having a CAPS score below 50. Moreover, the primary findings of this study would be unchanged if the more stringent criteria had been used to determine PTSD diagnosis.

symptom frequency. It has good internal consistency (α =.86–.89) and test-retest reliability (r = 84); convergent and criterion validity are strong (Kroenke, et al., 2001).

The Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986) was used to measure severity of dissociative experiences. This 28-item scale is the standard measure of dissociative symptoms and has been used extensively in clinical and nonclinical samples (van Izendoom & Schuengel, 1996). The DES asks respondents to rate on a scale of 0 to 100 the frequency of common symptoms of dissociation (e.g., autobiographic amnesia, derealization, depersonalization, and absorption). The DES was shown to have excellent internal consistency (α = .93), good temporal reliability (test-retest r = .74 to .84) (Holtgraves & Stockdale, 1997). Convergent, criterion, and predictive validity are strong (van Izendoom & Schuengel, 1996).

Combat exposure and disability status—All participants were queried with regard to the number of deployments and the severity of combat exposure. Severity of combat exposure was measured using a 16-item version of the measure reported by Hoge et al. (2004). Participants responded Yes/No to a series of questions concerning their exposure to combat during any deployment.

PTSD disability status was assessed by asking participants a series of questions. Participants were first asked if they have an approved service connected disability due to PTSD (permanent and total, or otherwise), if such a claim is pending, if such a claim has been denied, or if they have never filed a claim for PTSD related disability. Those participants with an approved disability due to PTSD were then asked to report the percent of its service connection.

Response style—The Miller Forensic Assessment of Symptoms Test (M-FAST: Miller, 2001) was used to determine over-reporting response style. The M-FAST is a 25-item structured interview with each item scored 0 (no or false) or 1 (yes or true). The M-FAST has demonstrated reliability and validity across a variety of settings (Miller, 2001; Jackson, Rogers, & Sewell, 2005; Veazey, Wagner, Hays, & Miller, 2005). The M-FAST has excellent internal consistency with total score alpha values equal or close to 0.90 (Miller, 2001; Jackson et al., 2005; Guy & Miller, 2004). In a previous study of combat-related PTSD (Freeman et al., 2008), the M-FAST had excellent agreement with the Structured Interview for Reported Symptoms (SIRS), a longer instrument used to detect elevated symptom reporting. We chose to use the M-FAST due to its shorter length of administration and high level of agreement with the SIRS (Guy & Miller, 2004). Presence of an over-reporting response style was determined by participants' total summary score on the measure. Although a cut-off score of six or more is frequently used to indicate elevated reporting in forensic samples (Jackson et al., 2005; Miller, 2001; Miller, 2004), we chose to use a cut-off of 8 as this cut-point appears to increase classification accuracy in mental health patient populations (Veazey et al., 2005). Using this cut-point, investigators categorized participants as being either positive for over-reporting bias (Over-Reporting+) or negative for over-reporting bias (Over-Reporting−).

Modified Stroop Task (MST): Stimuli and Apparatus—In the MST, the participants were presented with lexical stimuli and were instructed to identify the color of the font. Three types of words stimuli were used: neutral words (microwave, carpet, freezer, table, dishwasher, desk, refrigerator, lamp, sink, mirror, chair, curtain), social threat words (pathetic, stupid, mistake, inept, immature, insult, criticism, fail, silly, lonely, scorn, useless), and OEF/OIF deployment words (medivac, ambush, bodybag, desert, firefight, Iraq, explosion, bomb, IED, bullet, convoy, Baghdad). Some of the OEF/OIF deployment words have been used in previous studies of combat Veterans (Constans, 2004), but others were chosen from focus group findings and individual interviews with OEF/OIF Veterans. Words in all three categories were matched in length. Social threat and neutral words did not differ in terms of frequency based on standard word usage analysis texts (Francis & Kucera, 1982). Because it is difficult to assess common usage of OEF/OIF deployment, we did not attempt to match on word frequency. However, the majority of the OEF/OIF words were found to have distress ratings comparable with social threat words when emotional intensity of the words was tested with a group of university undergraduate students (Constans et al., 2004). All word stimuli were presented in red, blue, or green.

The stimuli were presented on an ultra-high resolution 17-inch monitor that was connected to a Pentium-4 2.40GHz computer. Stimuli were presented through use of Presentation® software (Version 0.70, www.neurobs.com). This software also allowed for voice latency recording through an omnidirectional lapel microphone which was attached to a SoundMAX Integrated Digital Audio sound card.

Procedure

Participants completed the MST as part of a larger assessment of physiological and behavioral indices hypothesized to be associated with PTSD. Prior to the MST practice trials, investigators informed participants that they should try to name the color of the words “as quickly and as accurately” as possible. The MST practice session consisted of 20 neutral words presented in red, blue or green color. Viewers were approximately 50 cm from the screen, and word stimuli were presented in 1 cm high uppercase letters in the center of the screen. Participants named the color of the word as quickly as possible. This practice session offered participants the opportunity to understand color-naming instructions, and provided the research assistant an opportunity to assess potential color-blindness. Following 20 practice trials, participants completed 108 active trials. Each word was presented three times, one time in each color. Word presentation order within each block of 36 words was randomly determined for the first participant and that word order was used for all subsequent participants. The recorded verbal response latencies served as the primary dependent variable. A research assistant was present in the room to record any color naming errors or audio detection errors.

Design and data analysis

As the primary aim of this project was to investigate whether PTSD-status and over-reporting bias were related to color-naming response times in an OEF/OIF sample, investigators categorized participants into each possible combination of the PTSD and Over-reporting conditions (i.e., a participant could be either positive or negative for PTSD and be

either positive or negative for over-reporting bias). Based this classification scheme, the sample was categorized as follows: PTSD+/Over-reporting+ (n=20), PTSD+/Over-reporting − (n=60), and PTSD−/Over-reporting− (n=44). The final cell, the PTSD−/Over-reporting+ condition, was empty as no PTSD− participants demonstrated an over-reporting bias. Although the presence of an empty cell presents data analytic challenges for determining interactions between PTSD and over-reporting, failure to observe participants in this cell likely is an accurate representation of the relationship between reported PTSD symptoms and response-style biases in combat Veterans. Those with an over-reporting response style are likely to endorse an elevated level of symptoms on any self-report measure of psychopathology. Thus, combat Veterans with an over-reporting response style are almost certain to endorse symptoms of PTSD as this disorder is broadly recognized as the signature mental health issue of contemporary Veteran populations. Following the suggestion of Tabachnick & Fidell (2007), we managed this data analysis challenge by creating a single, between-subject factor (Group) with 3 levels (PTSD+/Over-reporting+, PTSD+/Over-reporting−, and PTSD−/Over-reporting−) to categorize the participant sample.

Descriptive statistics were calculated for the entire sample. For clinician-rated PTSD severity, self-report measures of psychopathology, and deployment/combat variables, we tested for possible group differences using a 3-way Analysis of Variance (ANOVA; Group: PTSD+/Over-reporting+, PTSD+/Over-reporting−, and PTSD−/Over-reporting−). To examine overall between group differences in the status of service-connected PTSD disability claims, we first conducted a 3 (Group: PTSD+/Over-reporting+, PTSD+/Over-reporting−, and PTSD−/Over-reporting−) × 5 (Disability Status: permanent service connected disability, non-permanent disability, claim pending, claim denied, never filed a claim filed) chi-square analysis. To identify any specific between group differences in the prevalence of any individual disability status, we then calculated the relative risk of each status for all possible between group comparisons (i.e., PTSD+/Over-reporting+ vs. PTSD+/Over-reporting−, PTSD−/Over-reporting− vs. PTSD+/Over-reporting+, etc.).

To test the main hypothesis of interest, reaction time from the MST was used as the dependent variable in a 3 (Word-type: combat, social-threat, neutral) × 3 (Group: PTSD+/Over-reporting+, PTSD+/Over-reporting−, PTSD−/Over-reporting−) mixed ANOVA. Follow-up analyses on the MST data involved creation of threat interference indices. These indices served as a measure of the MST effect in an individual. Threat indices were calculated for each participant by subtracting his/her mean RT during presentation of an emotionally neutral stimulus from the mean RT during presentation of the threat stimulus. Two separate threat indices were calculated for each participant: a combat word threat interference index (RT combat word– RT neutral word) and a general threat word threat interference index (RT threat word – RT neutral word).

Results

Demographics and Clinical Characteristics

One hundred twenty-four individuals participated in this study (See Table 1). The majority of the participants were male (n=111). Mean age of respondents was 34 (*SD* = 8.9). Participants self-identified into the following ethnic categories: White (n=80), Black/

African-American (n=35), Hispanic (n=5), and other (n=4). Seventy-three participants were married, 26 were either separated or divorced, and 25 were never married. Education was measured as an ordinal variable with seven categories. The median category for educational attainment was “some college.” Income was measured as an ordinal variable with 5 categories. The median category for income was $20,000 – $40,000. One-hundred twelve participants were Army Veterans, 9 were Marines Veterans, and 3 were Air Force Veterans. The vast majority of participants (n=116) were enlisted personnel.

One-way ANOVAs showed a significant group main effect for total CAPS score and all self-report measures of psychopathology (*p*s <. 001; See Table 1). Follow-up contrasts using Fisher’s post-hoc tests indicated that all pairwise comparisons were significant (*p*s <. 001). Although the PTSD+/Over-reporting+ group showed the highest level of symptom reporting for each domain, the effect was particularly pronounced for the DES.

Combat Exposure and Disability Status

Possible group differences in combat exposure severity were assessed using a one-way ANOVA, and a main effect did emerge ($F(2,123)=5.10$, $p=.007$; See Table 2). Follow-up contrasts using Fisher’s LSD post hoc comparisons found the PTSD−/Over-reporting− group reporting less severe combat exposure than either PTSD+ group (*p*s<.01), but the PTSD+/Over-reporting+ and PTSD+/Over-reporting− groups were not significantly different with regard to combat exposure ($p=.53$). The three groups did not differ in the number of deployments, $F(2,123)<1$ (Table 2).

A one-way ANOVA tested for Group differences in percent service-connection for PTSD, and a significant main effect emerged, $F(2,121)=3.53$, p=.032. Follow-up analysis using Fisher’s LSD post-hoc comparisons showed that both PTSD+ conditions differed from the PTSD− condition (ps<.03) but the two PTSD+ groups did not differ (p=.60). The groups also differed in regard to their service connected PTSD disability status, $\chi^2(8, N=124) = 20.93$, $p=.007$. As seen in Table 3, post hoc calculations of relative risk revealed specific between group differences in the prevalence of certain disability statuses. The PTSD+/Over-reporting− group was approximately half as likely as those not reporting PTSD to have never filed a claim (Relative Risk = .41; 95% Confidence Interval: .24 – .72). Stated otherwise, those in the PTSD+/Over-reporting− group were twice as likely to have filed some sort of disability claim compared with those who were not diagnosed with PTSD. Never filing a claim was about one-fifth as common in the PTSD+/Over-reporting+ group as in those not endorsing PTSD (Relative Risk = .19; 95% Confidence Interval: .05 – .73). That is, those in the PTSD+/Over-reporting+ group were about five times as likely to have filed a claim compared those who were not diagnosed with PTSD. Among those reporting significant PTSD, however, the Over-reporting + group was not significantly more likely to have filed a disability claim as compared to the over-reporting− group. Indeed, there were no significant differences in the prevalence of any PTSD disability status between those who evidenced an over-reporting response style and those who did not.

Response Bias and the Modified Stroop Task Effect

Data included in this analysis consisted only of correct color naming responses that were made between three standard deviations of the individuals' mean response time after the word presentation. Incorrect responses were defined as an incorrect color name, an extraneous sound (e.g. cough) setting off the voice activated device, or a participant's initial response not being detected by the voice-activated device. The mean percentage of responses excluded for the PTSD−/Over-reporting−, PTSD+/Over-reporting−, and PTSD+/Over-reporting+ groups were 0.70%, 0.65%, and 0.58% respectively. There was no significant difference between groups on the number of items excluded F (2,121)= 0.21, p = .89.

The mean color naming latencies and standard deviations are presented in Table 4. A 3 (Group) × 3 (Word Type) mixed-design ANOVA revealed a significant main effect for Group, $F(2,121) = 6.17$, $p = .003$, and Word Type $F(2,242) = 41.94$, $p<.001$. The main effects were limited by a significant Group x Word Type interaction $F(4,242) = 3.85$, $p = .005$. To help explain how the interaction between PTSD status and over-reporting bias might manifest in attentional bias for combat words, we calculated a combat threat interference index by subtracting neutral word color-naming latency from combat word color-naming latency. The positive values of the resulting combat threat interference index would reflect greater attentional bias to combat related words. This measure was used as the dependent variable in a one-way ANOVA with Group as the single between-subject factor. This analysis showed a main effect for Group $F(2,121)=5.34$, $p=.006$. Multiple comparisons between the groups using Fisher's LSD post hoc tests showed that differences between PTSD−/Over-reporting− and PTSD+/Over-reporting− approached significance (p=.079). Differences between PTSD+/Over-reporting+ and both PTSD+/Over-reporting− and PTSD−/Over-reporting− were significant (ps=.046 and .002, respectively). Thus, the combat-related MST effect proved most robust for the PTSD+/Over-reporting+ participants. A social threat interference index was calculated by subtracting neutral word color-naming latency from social-threat word color-naming latency. A one-way ANOVA was significant for Group $F(2,121)=5.28$, $p=.006$. Multiple comparisons between the groups using Fisher's LSD post hoc contrasts showed that PTSD−/Over-reporting− participants differed from both PTSD+/Over-reporting−and PTSD+/Over-reporting+ participants (p=.03 and .002, respectively) but the PTSD+/Over-reporting− and PTSD+/Over-reporting+ groups did not differ (p=.124).

Discussion

The most notable finding of this study is that the presence of an over-reporting bias augments the combat MST effect in Veterans with PTSD. In other words, we found that Word type and Group interacted such that the PTSD+/Over-reporting+ participants showed increased slowing to combat words when their responses were compared with the responses of either the PTSD−/Over-reporting− or PTSD+/Over-reporting− participants. This finding runs counter to the suggestion that PTSD participants with an over-reporting bias would show an attenuation of the combat-related MST effect compared with PTSD participants without over-reporting bias. This prediction of an inverse relationship between over-

reporting bias and MST effect rested on the assumption that the M-FAST is a measure of outright exaggeration of symptoms in PTSD participants and that the PTSD diagnosis could be inaccurate or grossly embellished. We assumed that, because combat MST effect is directly associated with PTSD, one would not have expected to observe a combat MST effect (or if present, to an attenuated degree) when there was evidence of an over-reporting response style.

Our finding that PTSD participants with over-reporting biases actually demonstrated larger combat MST effect might be more consistent with the possibility that the M-FAST is a general measure of distress or as a "cry for help," rather than a measure of frank malingering, in this population (Garcia, Franklin, & Chamblis, 2010; Guriel & Fremouw, 2003; Hyer, Fallon, Harrison, & Boudewyns, 1987). Since the MST effect is not easily feigned or controlled by respondents (Buckley et al., 2003), it is difficult to understand how study participants with higher M-FAST scores could have manipulated the MST in a manner consistent with responses of PTSD participants without an over-reporting response style. The results may be more understandable if the M-FAST is viewed as a partial measure of strong negative emotionality rather than outright symptom fabrication.

It is important to note, however, that our results do not necessarily mean that the high levels of distress are the direct effect of combat trauma *per se*. The strengthening of the MST effect in individuals with an over-reporting response style would occur as long as the individual was attributing the source of his/her high level of negative emotions to combat experiences, regardless of whether the distress actually originated with combat trauma. In other words, an augmentation of attentional bias to combat trauma cues could possibly occur if an individual repeatedly rehearsed reasons why their very real distress was related to trauma - even if the actual cause of distress was not related to the trauma. This may be particularly the case with combat Veterans for whom combat exposure may serve as a readily identifiable and socially sanctioned stressor that justifies and explains their distress. Our results also do not rule out the possibility that financial incentives also may contribute to the attribution of distress to trauma as the report of more severe PTSD symptoms may result in higher disability compensation.

Our data also suggests that there may be certain aspects of the over-reporting group that may predispose them to misattribute their distress to combat trauma. Although we found differences between Over-reporting+ and Over-reporting− groups on all self-report measures, the effect size was particularly pronounced on the measure of dissociative experiences.[2] The magnitude of this difference between PTSD+/Over-reporting+ and PTSD +/Over-reporting− participants on the DES suggests the effect is not entirely an artifact of dissimulation but may represent a meaningful difference in dissociative experiences. Dissociation is highly related to suggestibility, false memory, and fantasy proneness (Holmes et al., 2005; Merckelbach, Muris, Rassin, & Horselenberg, 2000). Any proneness to suggestibility and fantasy could potentially facilitate the internalization of the role of a PTSD sufferer and the attribution of distress to combat cues even among those who did not

[2]Dissociative experiences were strongly related to M-FAST scores operationalized both dichotomously ($r = .62$, $p < .001$) and continuously ($r = .70$; $p < .001$).

experience highly traumatogenic combat experiences. Highly suggestible and highly distressed individuals may inadvertently impose a "traumatized" identity onto their lives, leading to broad changes in memory and other cognitive processes (McNally & Geraerts, 2009; Geraerts et al., 2008; Geraerts et al., 2009). In sum, it may be that social and financial incentives may lead suggestible yet highly distressed Veterans to adopt and repeatedly enact an identity as someone with PTSD, such that they take on the information-processing biases characteristic of this disorder.

We must acknowledge that high levels of dissociative experiences could have directly led to the observed elevations in M-FAST scores even among patients with genuine combat-related traumatic stress disorders. Dissociative symptoms can result from trauma. In fact, the most recent psychiatric nosology, DSM-5, now includes a PTSD subtype characterized by dissociative symptoms (American Psychiatric Association, 2013). Dissociation and fantasy proneness are associated with a positive response bias when answering odd items (Merckelbach, Muris, Horselenberg, & Stougie, 2000). Thus, individuals with valid cases of PTSD who are also high in dissociative experiences may elevate measures of over-reporting even when responding to measures in good faith. Our findings could therefore represent, at least in part, Veterans with actual PTSD and associated information processing biases being "incorrectly" classified as symptom over-reporters due to higher levels of dissociative experiences. In possible support of the interpretation that the M-FAST does not measure outright malingering due to secondary gain, we did not find any differences between PTSD participants with and without over-reporting biases on our measure of disability-compensation seeking. Although all PTSD participants were more likely to seek disability compensation than non-PTSD participants, over-reporting bias did not appear to further effect disability-seeking behavior in the PTSD participants.

Limitations

We categorized each participant as being either positive or negative on both PTSD and over-reporting. We choose this data-analytic strategy because both variables are treated as dichotomous constructs in clinical usage. That is, an individual is considered as either having or not having PTSD and either over-reporting or not over-reporting psychiatric symptoms. This strategy, however, yielded a study design that was not fully crossed with regard to the two critical independent variables, PTSD and over-reporting response bias. And, thus, this naturalistic design led to a nesting of over-reporting response style within PTSD diagnosis and limited our ability to fully explore the interaction between these two constructs. We argue, however, that the nesting that is observed represents an accurate reflection of the population of interest – combat Veterans. The use of other data analytic strategies (i.e., multiple regression using continuous variables) is further complicated by substantial multicollinearity. Nonetheless, when examining a regression model with continuous variables the same pattern of results emerges, and we argue that our results accurately reflect the impact of the MFAST on MST effect in OEF/OIF Veterans.

Our conclusions rest on the assumption that the MST effect is not easily feigned by over-reporters as has been found in previous research using actors trained to simulate PTSD (Buckley et al., 2003). However, this possibility of MST effect manipulation cannot

completely be ruled out as there may be substantive differences between the actors in the Buckley et al. (2003) study and combat Veteran malingerers. For example, it might be that combat Veterans who may be feigning for secondary gain may be able to draw upon their combat experiences when acting out their dissimulations. Such dissimulators may have numerous opportunities for practicing their "performance" of PTSD, as they may be called on to demonstrate their impairments repeatedly to clinicians and administrative personnel in order to create a consistent picture of themselves as someone with PTSD. It is possible that the combination of these factors in the process of real-life PTSD dissimulation could impact the information-processing of subsequent trauma cues, including that found in the MST.

We propose, however, that the results were not due to the conscious manipulation of symptoms but instead occurred because high levels of legitimate distress. We also proposed that dissociation-prone over-reporters may have been more likely to misattribute the cause of any distress to an easily identified and socially-appropriate stressor (e.g., deployment) and thus experienced a strong association between negative affect and combat trauma cures, akin to that found in PTSD. In other words, we propose that suggestibility could be a partial cause for PTSD-like associations to trauma cues, and this association then led to a larger combat MST effect in Over-reporting+ participants. However, we fully admit that the causal relationship between dissociation and PTSD/PTSD-like symptoms may be reversed. That is, high levels of PTSD may induce increased dissociative experiences, and if so, the association between dissociation and the combat MST effect would be spurious. Additionally, our suggestion that dissociation-proneness may be an important factor in the misattribution of distress to deployment was based partially on the observation that Over-reporting+ participants evinced extremely high DES scores. Though a meaningful relationship between dissociation proneness and over-reporting is documented in the literature (Giesbrecht, Lynn, Lillienfeld, & Merckelbach, 2008; Johnson, Edman, & Danko, 1995; Merkcelbach et al., 2000), because both the DES and M-FAST include items that reflect unusual experiences, item-content similarity may have artificially inflated the relationship between the DES and M-FAST.

Summary

A starting point for this study was the proposition that the MST might be helpful in determining the validity of a PTSD diagnosis. If an over-reporting response style suppressed the association between PTSD and the combat MST effect, then it might be possible to use the MST effect as a more objective indicator of PTSD than self-report or interview assessments. Since we found evidence of the opposite - that that presence of an over-reporting response style was associated with an augmentation of the MST effect in OEF-OIF Veterans with PTSD - the MST does not appear add any additional information to PTSD diagnostic validity beyond that already conferred by a structured clinical interview. Indeed, rather than helping to clarify the complex and controversial issue of over-reporting in claims of PTSD among Veterans, our results seem only to complicate matters further. The study does raise a number of interesting issues regarding the meaning of the MST effect and of the meaning of over-reporting in those claiming PTSD. Most intriguingly, our findings raise the possibility that the real life process of over-reporting PTSD symptoms may allow for the development of information-processing biases characteristic of this disorder. We suggest,

albeit quite speculatively, that dissociation proneness may be an important moderating variable, but this study was not designed to test this post-hoc hypothesis.

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Table 1

Demographics and Clinical Characteristics

	Total Sample (*N* = 124)		**PTSD−/Over-reporting− (*n* = 44)**		**PTSD+/Over-reporting− (*n* = 60)**		**PTSD+/Over-reporting+ (*n* = 20)**	
Gender								
Male	89.5%		88.6%		91.7%		85.0%	
Female	10.5%		11.4%		8.3		15.0%	
Race/Ethnicity								
Non-Hispanic								
White	64.5%		70.5%		65.0%		50.0%	
Black	28.2%		27.3%		25.0%		40.0%	
Hispanic	4.0%		0.0%		6.7%		5.0%	
American Indian/Alaskan Native	1.6%		2.3%		0.0%		0.0%	
Asian/Pacific- Islander	0.8%		0.0%		3.3%		0.0%	
Not Sure	0.8%		0.0%		0.0%		5.0%	
Income								
Less than $20,000	25.8%		11.4%*		30.0%[a]		45.0%[a]	
$20,000 – $39,999	33.9 %		36.4%		33.3%		30.0%	
$40,000 – $59,999	14.5%		15.9%		13.3%		15.0%	
$60,000 – $79,999	13.7%		18.2%		13.3%		5.0%	
$80,000 or more	12.1%		18.2%		10.0%		5.0%	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Age	33.84	8.63	36.48*	9.98	33.12	7.71	30.20	6.37
CAPS	66.65	28.64	36.23*	17.72	79.50*	16.56	95.00*	15.39
PCL	60.17	14.70	47.98*	14.10	64.35*	9.94	74.45*	7.10
PHQ	14.15	7.16	8.00*	5.29	16.25*	5.68	21.40*	3.44
DES	28.97	21.50	13.78*	10.74	30.24*	15.98	58.84*	20.31

* significantly different from other two groups at .05 level

[a] significantly different at .05 level from PTSD−/Over-reporting−

[b] significantly different at .05 level from PTSD+/Over-reporting−

[c] significantly different at.05 level from PTSD+/Over-reporting+

Table 2

Mean scores for Combat Experiences, Number of Deployments, and Percent service-connected for PTSD.

	Total Sample (*N* = 124)		**PTSD−/Over-reporting− (*n* = 44)**		**PTSD+/Over-reporting− (*n* = 60)**		**PTSD+/Over-reporting+ (*n* = 20)**	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Combat Experiences	9.83	3.81	8.43[b,c]	3.59	10.45[a]	3.70	11.05[a]	3.89
Deployments	1.90	1.35	1.82	1.10	2.03	1.57	1.70	1.70
Percent service-connected for PTSD	17.8	26.8	9.55[b,c]	19.00	21.50[a]	29.00[a]	25.00[a]	28.00

[a] significantly different at .05 level from PTSD−/Over-reporting−

[b] significantly different at .05 level from PTSD+/Over-reporting−

[c] significantly different at.05 level from PTSD+/Over-reporting+

Combat Experiences Scale adapted from version reported by Hoge et al-

Deployments – Self-reported number of deployments

Table 3

Relative risk of disability status by group.

Comparison	Disability Status				
	Never filed a claim	Permanent and Total Service Connected Disability	Approved Service Connected Disability	Claim Pending	Claim Denied
PTSD+/Over-reporting−vs. PTSD−/Over-reporting−	.41*	.49	2.51*	1.22	2.20
PTSD+/Over-reporting+vs. PTSD−/Over-reporting−	.19*	†	3.14*	1.47	2.20
PTSD+/Over-reporting+vs. PTSD+/Over-reporting−	.46	†	1.25	1.20	1.00

*Significant using 95% Confidence Interval

†Not calculable because no participants in the PTSD+/Over-reporting+ group acknowledged a permanent and total service connected disability.

Table 4

Mean Color-Naming Latency (ms) as a Function of Group and Word Type

Word Type	Group		
	PTSD− / Over-reporting− (n=44)	PTSD+/ Over-reporting− (n=60)	PTSD+/ Over-reporting+ (n=20)
Combat Threat			
M	1.41	1.54	1.74
SD	0.21	0.34	0.41
Social Threat			
M	1.34	1.47	1.63
SD	0.16	0.28	0.48
Neutral			
M	1.34	1.40	1.50
SD	0.21	0.27	0.35