



Current PTSD symptomatology distorts memory for past symptoms

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ABSTRACT

Clinicians often rely on clients' retrospective reports of past symptoms to diagnose and treat Posttraumatic Stress Disorder (PTSD). However, there is limited research investigating memory for past PTSD symptoms. We asked sexual assault survivors to report their PTSD symptoms and then recall them 6 months later. *Overall*, symptom recall was consistent with initial reports. However, after dividing participants into PTSD-positive and negative groups, we found that people who were PTSD-negative at follow-up underestimated past PTSD symptom severity while people who were PTSD-positive overestimated past symptoms. For example, 2.8% of PTSD-negative participants versus 15.9% of PTSD-positive participants recalled experiencing 20+ more points on the PCL-5 at follow-up than at initial assessment. Further, people who adjusted over time greatly underestimated past symptoms unlike those who remained PTSD-positive. Our findings have important theoretical and clinical implications because they show that current symptom severity may influence the memory reconstruction of prior levels of adjustment.

1. Introduction

The persistence of Posttraumatic Stress Disorder (PTSD) symptoms over 1-month is one of the requirements for a PTSD diagnosis. However, past research (e.g., [Harvey and Bryant, 2000](#); [Schrader et al., 1990](#)) has found that distressed people overestimate past symptoms and healthy people underestimate them. This bias may have important implications. For example, people who remember (vs. forget) past suicidal ideation have worse functioning during follow-up ([Goldney et al., 2009](#)). Further, people who remember *more* trauma than they actually experienced over time also exhibit more distress (e.g., [Southwick et al., 1997](#)). Here, our aim was to investigate how accurately people recall their past PTSD symptoms and whether current PTSD affects accuracy.

In practice, clinicians often only have the client's report of their experienced trauma and past symptoms. However, people's recall of their own symptoms is not always accurate. For example, in [Harvey and Bryant \(2000\)](#), victims reporting high current levels of PTSD severity recalled experiencing more acute stress disorder (ASD) symptoms than they had reported two years earlier; people with low current levels of PTSD severity, however, recalled experiencing fewer ASD symptoms than initially reported (see also [Safer and Keuler, 2002](#)). Therefore, current concerns appear to influence memory reconstruction of past symptoms. People may believe they experienced symptom severity

comparable to current severity. Alternatively, distressed people may appraise the trauma event and past symptoms as worse than initially reported to understand, or justify, current symptomatology. People who have recovered from their trauma, however, may appraise their trauma as less negative, leading them to judge past emotional responses as less severe than they actually were (see [Levine et al., 2009](#)). Minimizing past symptom severity may, in fact, facilitate adjustment (e.g., [Goldney et al., 2009](#)).

Currently, there is limited research investigating inaccuracy of PTSD symptom recall. However, a related line of research has compared daily versus retrospective reports of PTSD symptoms. For example, [Priebe et al. \(2013\)](#) found that daily reports of intrusions and flashbacks regarding child sexual abuse were about 50% higher than retrospective reports of such symptoms made at the end of the week by the same participants. However, because participants were assessed during ongoing trauma-focused therapy, they may have recalled fewer symptoms retrospectively because they were adjusting. Given the small sample size ($N = 28$), even a few recovered participants may have inflated the effect (see [Szucs and Ioannidis, 2017](#)). [Naragon-Gainey et al. \(2012\)](#) found daily and retrospective reports for PTSD scores were similar, although means were consistently higher in retrospective reports. However, only 20% of the sample screened positive for current PTSD; people with low symptom severity may tend to recall any symptoms consistently with their initial reports. Lastly, [Campbell et al. \(2017\)](#)

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found that people with co-occurring PTSD and alcohol use dependence recalled more symptoms retrospectively than in daily reports made over a month.

In light of these inconsistent findings, further research will aid our understanding of memory for past PTSD symptoms and whether it differs between people who screen positive for PTSD and those who do not. We asked participants to report their symptoms in relation to a sexual assault experienced in the last five years and then recall those symptoms again 6 months later. At the second time-point, we also measured current PTSD symptoms to determine which participants met provisional PTSD diagnosis at that time-point (labelled PTSD-positive), based on an established self-report measure of PTSD. We hypothesized that participants who were PTSD-negative at follow-up would underestimate past PTSD symptoms while those who were PTSD-positive would overestimate past symptoms. Based on Goldney et al.'s (2009) finding that people who forgot (vs. remembered) past suicidal ideation were functioning better during follow-up, we also hypothesized that participants who were PTSD-positive at Time 1 but not at Time 2 and demonstrated a clinically meaningful change (i.e., they adjusted over time) would underestimate past symptoms¹; those who remained PTSD-positive across both times (no psychological adjustment over time) would not.

2. Method

2.1. Participants

A power analysis for a matched pairs *t*-test (using G*Power; Faul et al., 2007; $d = 0.20$, power = 0.95, and alpha = 0.05) indicated we required a sample size of at least 327 participants. We ran extra participants at initial assessment in case of attrition. Four hundred and twenty female participants who had experienced at least one Criterion-A sexual assault event² were recruited from the online recruiting platform Amazon Mechanical Turk (restricted to US workers who had an approval rating of at least 95%). We excluded nine participants for completing Time 2 beyond the one-month deadline (i.e., more than seven months after Time 1) and one participant who received and completed Time 2 one month before they were scheduled to do so (due to experimenter error). Of the remaining 410 participants, mean age was 34.27 ($SD = 9.67$; range = 23–69). Of these participants, 77.1% were Caucasian/White, 7.8% were Black, 7.1% were Mixed, 2.7% were Hispanic, 2.2% were Asian, 1.2% were Latino, 1.8% were Other or unclear. Participants received US\$3.00 for their time.

2.2. Materials

2.2.1. Trauma exposure scale

We asked participants, at two time-points with a 6-month delay, about their sexual assault experiences. We used a 19-item trauma exposure scale (e.g., “A man has put his penis into my vagina without my consent”) that we developed to capture participants’ unwanted Criterion A sexual experiences (actual or threatened sexual violence; see DSM-5; American Psychiatric Association, 2013) that occurred in the past 5 years (Time 1) or 5.5 years (Time 2 after the six-month delay). The 19th item was an “other” option, allowing participants to

¹ We operationalized “adjusted” conservatively because a person could recall one symptom point less and go from above to below the cut-off, or demonstrate significant change but still experience severe PTSD at both times.

² Participants were tested as part of a larger longitudinal study. As part of that larger study, participants reported their sexual assault exposure, including in specific contexts (e.g., when they were drinking), if they had discussed or reported their trauma and with whom, and if they had been exposed to media reports about their events and similar events. We also measured participants’ mood, depression, and trauma-related thoughts but do not report these results here.

add unlisted events.³ There were two versions of the scale. In the first version, participants were required to respond “yes” or “no” for each item in regard to whether they had experienced the event described. In the second version, participants rated whether they had experienced the sexual assault events on a likelihood scale (1 = definitely did not happen; 8 = definitely did happen). We do not examine consistency of responses on the trauma exposure scale in this paper. We also did not find differences in PCL-5 total or subscale scores between the two versions and, therefore, analyzed them together. We found that both versions were internally consistent (Cronbach's α for version 1 = 0.82–0.85; version 2 = 0.84–0.88).

2.2.2. PTSD Checklist-5 (PCL-5)

We used the 20-item PCL-5 to assess participants’ trauma symptoms in relation to the unwanted sexual experience that bothered them the most (PCL-5; Weathers et al., 2013). Participants rated the extent to which they had been bothered by potential PTSD symptoms (e.g., “Repeated, disturbing, and unwanted memories of the stressful experience?”) in relation to the sexual assault experience (0 = not at all; 4 = extremely). The PCL-5 comprises four cluster subscales—intrusions, avoidance, negative alterations in cognition and mood, and alterations in arousal and reactivity—that reflect the diagnostic criteria according to the DSM-5 (American Psychiatric Association, 2013; see Supplementary Data at <https://osf.io/bdax7/> for subscale data). The PCL-5 can be used to make a provisional PTSD diagnosis (with a cut-off score of 31; Ashbaugh et al., 2016; Bovin et al., 2016). The PCL-5 possesses strong psychometrics, including internal excellent consistency, good test-retest reliability, and good convergent validity with other PTSD measures (see Blevins et al., 2015).⁴ We also found excellent internal consistency at both times ($\alpha = 0.95$ –0.96).

2.3. Procedure

This research was approved by the Flinders University Social and Behavioural Research Ethics Committee. At Time 1, after informed consent was obtained, we first assisted participants in remembering what they were doing 5 years before with an anchoring task we developed (based on Loftus and Marburger, 1983). Participants selected one of four significant international events that occurred at around the same time of the year 5 years before (or a personal important event if they remembered none) and answered six questions about the circumstances in which they heard about the event (e.g., where they were when they heard). Participants then completed the trauma exposure scale, the other measures described in Footnote 2, and the PCL-5.⁵ After a 6-month delay, participants completed the same questionnaires again. The PCL-5, however, was taken twice at this time-point: once to measure participants’ current symptoms and another to measure recall of symptoms experienced 6 months before. In summary, participants

³ Two independent coders coded whether the “other” event: clearly occurred before the participant was 18, did not mention a specific event (“I can’t remember...I kind of lost track...”), only mentioned the context in which the event likely occurred (“drunk”), was not considered traumatic (“catcalling”) or sexual (“rude comments”), or repeated an event that they had already said “yes” to on the exposure scale list. These responses were removed (changed from “yes” to “no”) if both coders agreed. We removed 23 “other” responses at T1 and 17 at T2. At the end of T2, participants were asked whether each event they said “yes” to on the trauma exposure scale actually occurred in the six-month delay (yes/no). The corresponding responses on the trauma exposure scale were then changed from “yes” to “no.”

⁴ Fifteen responses to individual items at T1 were missing. We replaced missing responses with the mean of the answered items in the subscale (Bell et al., 2016).

⁵ Exactly when the most recent experience occurred varied among participants, but there was no difference between the PTSD-positive and negative groups.

completed the PCL-5 three times: at Time 1 (T1), 6-months later at Time 2 (T2), and while recalling their T1 symptoms (Recall of T1). At T1 and T2, they were instructed to rate how much they had been bothered by each problem in *the last month*. At Recall of T1, they were instructed to rate how much they had been bothered by each problem 6 months before. Participants were debriefed (which included a list of contact details for support services) and paid. Data can be accessed at <https://osf.io/bdax7/>.

3. Results

First, we found that T1 scores correlated with Recall of T1 ($r = 0.70$, $p < .001$) and T2 ($r = 0.69$, $p < .001$) scores. Importantly, we found a large correlation between Recall of T1 and T2 scores ($r = 0.88$, $p < .001$), providing preliminary evidence that recall of past symptoms is related to current symptom severity. We also examined whether PTSD severity increased or decreased over time across our sample. Across the whole sample, there was a small but significant decrease in mean PCL-5 scores between T1 and T2, $t(409) = 2.39$, $p = .017$, $d = -0.09$ ⁶; Table 1. We then ran a Bayesian paired t -test. Briefly, a Bayes factor of BF_{01} suggests the data are n times more likely under H_0 (a hypothesis that there is no difference between groups) than H_1 (a hypothesis that there is a difference between groups; Jarosz and Wiley, 2014). We found a $BF_{01} = 1.08$ between T1 and T2 PCL-5 scores, suggesting it is 1.08 times more likely the null (vs. true) hypothesis is true, anecdotal evidence for the null hypothesis (Wetzels et al., 2011).

We next examined differences between PCL-5 scores reported at T1 and Recall of T1 symptoms (assessed at Time 2) across our sample. There was only a small difference between mean PCL-5 total scores at T1 and Recall of T1 across our sample ($t(409) = -.22$, $p = .824$; $d = 0.01$; $BF_{01} = 17.59$, indicating strong evidence of no difference over time; Table 1). Therefore, when we analyzed across all participants (that is, including those who underestimated and those who overestimated symptoms), memory for symptoms was largely consistent with what they reported initially.

Following Engelhard et al. (2008), we divided participants into PTSD-negative ($N = 253$) and PTSD-positive ($N = 157$) groups at T2. Tables 1 and 2 show PCL-5 mean scores and degree of discrepancy in mean scores over time across participants and separated by those who were PTSD-positive and PTSD-negative. We found a significant group \times assessment time interaction, $F(1, 408) = 28.88$, $p < .001$, $\eta_p^2 = 0.07$. Bonferroni adjusted pairwise comparisons showed that, as expected, participants who were PTSD-negative recalled experiencing fewer total symptoms than initially reported ($p = .002$, $d = 0.21$), while participants who were PTSD-positive recalled experiencing more total symptoms than initially reported, $p < .001$, $d = 0.33$. We also found that PTSD-positive participants reported more symptoms at T1 and Recall of T1 than PTSD-negative participants, a main effect of provisional PTSD diagnosis, $F = 421.25$, $p < .001$, $\eta_p^2 = 0.51$.

To investigate the relationship between underreporting prior symptoms and adjustment, we looked at symptom recall for people who demonstrated adjustment, that is, were PTSD-positive at T1 but not at T2 and showed a clinically meaningful change over time (using the Reliability of Change Index (RCI)⁷; Jacobson and Truax, 1991; $N = 24$) compared to those who remained PTSD-positive over time, $N = 117$. We found a significant group \times assessment time interaction, $F(1, 139) = 111.07$, $p < .001$, $\eta_p^2 = 0.44$. Participants who demonstrated adjustment recalled significantly fewer symptoms than initially reported, T1: $M = 43.18$, $SD = 7.40$; Recall of T1: $M = 13.79$, $SD = 8.67$;

$p < .001$, $d = 3.65$. Participants who remained PTSD-positive over time recalled their symptoms accurately, T1: $M = 49.14$, $SD = 11.16$; Recall of T1: $M = 48.45$, $SD = 14.55$; $p = 0.544$, $d = 0.05$, $BF_{01} = 8.25$ (indicating substantial evidence of negligible differences). There were two main effects: participants recalled fewer symptoms than they initially reported ($F(1, 139) = 121.89$, $p < .001$, $\eta_p^2 = 0.47$), and participants who remained PTSD-positive over time reported more symptoms than those who demonstrated adjustment, $F(1, 139) = 72.01$, $p < .001$, $\eta_p^2 = 0.34$.

4. Discussion

Overall, our results show that people may draw on *current* appraisals of, and reactions to, their trauma to help reconstruct how they felt before. People who were PTSD-negative at T2 or demonstrated adjustment over time, for example, recalled experiencing fewer symptoms than initially reported. This finding fits with data showing that forgetting past suicidal ideation or behaviors is related to better functioning (Goldney et al., 2009; Klimes-Dougan et al., 2007). Therefore, forgetting or appraising the trauma and subsequent symptoms as less important over time may be an adaptive adjustment mechanism that helps people regulate negative emotion (see Levine et al., 2009), contrary to most theories and clinical approaches in treating PTSD. Further, adjusting or recovering over time may lead people to reinterpret or minimize (and underreport) the severity of earlier symptoms (e.g., initially interpreting nightmares as recurrent and severe but, after adjusting, viewing them as occasional, unexceptional bad dreams). It is important to remember, however, that our data are observational and we cannot determine whether forgetting symptoms led to adjustment or vice versa.

Interestingly, the possibility that forgetting or minimizing symptoms may be related to adjustment is consistent with the fading affect bias (FAB)—emotion accompanying negative (vs. positive) event memories fades faster (see Walker and Skowronski, 2009 for review). Walker and Skowronski (2009) speculate that the FAB is an adaptive emotion regulation mechanism that helps create and maintain a positive emotional state that can prepare a person to overcome adversity. People experiencing symptomatology exhibit a disrupted FAB. For example, negative emotions fade slower and positive emotions fade faster for dysphoric (mildly depressed) participants, than for non-dysphoric participants (Walker et al., 2003). Further, higher trait anxiety is associated with less affective fading for both positive and negative events (Walker et al., 2014). Future research examining symptom recall could measure affect intensity at both times to explore whether fading of negative affect accompanying the trauma occurs more in the PTSD-negative versus PTSD-positive group.

Importantly, people who were PTSD-positive recalled experiencing more symptoms than initially reported; for example, 15.9% of PTSD-positive participants (vs. only 2.8% of PTSD-negative participants) reported 20+ more points on the PCL-5 at Recall of T1 compared to T1, further suggesting that current symptomatology influences memory for past symptom severity. This finding fits with “memory amplification” studies that have found that people who later report experiencing trauma events that they initially failed to remember also experience more PTSD symptoms (see van Giezen et al., 2005, for review). Therefore, traumatic events that people initially saw as insignificant (and did not endorse) are relabeled as significant and endorsed to understand or justify current distress (Engelhard et al., 2008). The same mechanism may apply to symptoms. However, we note that people who remained PTSD-positive over time were consistent in their symptom reports, suggesting that overestimating or accurately recalling symptoms are both related to experiencing current distress.

Overestimating (or failing to minimize) past PTSD symptoms could indicate that people have incorporated their trauma into their self-identity. A person's current sense of self—including their current goals, motivations and concerns—influences how they reconstruct memories

⁶ Because ES CI software (Cumming, 2012) does not calculate effect size confidence intervals for paired sample t -tests with degrees of freedom greater than 200, we do not report this information.

⁷ The RCI specifies the amount of change a client must show between measurement occasions for that change to be reliable, that is, larger than that reasonably expected due to measurement error alone.

Table. 1

PCL-5 means (and standard deviations) across all participants, as well as separated by provisional PTSD status.

	Total PTSD	Intrusions	Avoidance	Negative alterations in cognitions and mood	Alterations in arousal and reactivity
All participants					
Time 1	27.38 (19.10)	6.15 (5.05)	3.92 (2.58)	9.14 (7.36)	8.16 (6.39)
Recall of Time 1	27.55 (20.56)	5.78 (5.20)	3.51 (2.62)	9.73 (8.17)	8.52 (6.47)
Time 2	25.58 (19.41)	5.53 (4.93)	3.40 (2.69)	8.92 (7.61)	7.73 (6.36)
PTSD-positive					
Time 1	41.38 (16.98)	9.42 (5.22)	5.04 (2.38)	14.22 (7.01)	12.70 (5.66)
Recall of Time 1	46.59 (14.63)	10.08 (4.77)	5.48 (2.09)	16.89 (6.18)	14.13 (4.87)
Time 2	46.55 (11.53)	10.07 (4.46)	5.57 (2.03)	16.73 (4.95)	14.18 (4.46)
PTSD-negative					
Time 1	18.69 (14.69)	4.12 (3.71)	3.23 (2.45)	5.99 (5.62)	5.35 (5.07)
Recall of Time 1	15.74 (13.70)	3.11 (3.33)	2.29 (2.13)	5.28 (5.73)	5.05 (4.63)
Time 2	12.57 (9.23)	2.72 (2.53)	2.06 (2.10)	4.07 (4.15)	3.72 (3.36)

Note. PCL = Posttraumatic Stress Disorder Checklist.

Table. 2

Percentage of participants who exhibited discrepancies between T1 and Recall of T1 on the PCL-5.

Recall change	Overall sample (N = 410)	T2 PTSD-positive sample (N = 157)	T2 PTSD-negative sample (N = 253)
No change	4.4	2.5	5.5
Recalled 1–5 points more than initially reported	17.3	16.6	17.8
Recalled 6–10 points more than initially reported	8.5	10.8	7.1
Recalled 11–20 points more than initially reported	12.9	16.6	10.7
Recalled 20+ points more than initially reported	7.8	15.9	2.8
Recalled 1–5 points less than initially reported	17.1	12.7	19.8
Recalled 6–10 points less than initially reported	10.5	8.3	11.9
Recalled 11–20 points less than initially reported	12.7	10.2	14.2
Recalled 20+ points less than initially reported	8.3	5.7	9.9

Note. PCL = Posttraumatic Stress Disorder Checklist.

(see Conway, 2005; Conway and Pleydell-Pearce, 2000), which may distort retrospective reports of symptoms. People experiencing mood and anxiety disorders often experience mood-congruent memory biases (e.g., depressed people recall more negative than positive memories; Bradley and Mogg, 1994). Similarly, people with PTSD report that their trauma has become part of their identity and perceive more connection between the trauma and current life events (Berntsen et al., 2003). Therefore, they may use their trauma and subsequent symptoms as a reference point for organizing other memories.

Safer and Keuler (2002) suggest that overestimating past distress may motivate people to mobilize coping resources to deal with the threat. Furthermore, people may overestimate past distress to maintain positive illusions by perceiving greater positive change in their recovery than is actually the case (see Levine et al., 2009). However, because we found that Recall of T1 symptoms was not higher than current T2 symptoms for PTSD-positive participants, this explanation of our data is unlikely. We also acknowledge the possibility that participants' recall of their symptoms may be more accurate than what was initially reported.

Our study has several limitations. First, the underlying mechanism (s) we have proposed for our results are speculative. Future research possibilities include asking participants why their reports changed over time (see Engelhard and McNally, 2015), although not all participants may have insight. Second, it is difficult to know how accurately participants were able to localize their retrospective self-report to 6 months before, a potential issue across many retrospective recall paradigms. Third, initial assessment of PTSD symptoms was up to five years post-trauma; symptoms experienced that long after the initial event may have been affected by other factors (e.g., new/ongoing assault). However, when we examined data from participants who experienced their most recent sexual assault experience within the last month (similar to Harvey and Bryant, 2000), we still found an interaction: PTSD-negative participants' recall scores were consistent with T1 scores ($p = .701$),

while PTSD-positive participants overestimated past symptom severity ($p = .017$). However, group *N*s were small (40 vs. 11), suggesting we must interpret this analysis with caution. Third, we could not corroborate that trauma events really occurred or when they occurred. However, this issue exists in most studies examining memory for personal trauma, and is difficult to resolve given that even reports from law enforcement are also likely based on self-report statements. Fourth, we initially defined recall inconsistency as any change on the PCL-5 over time, which may be too liberal. However, we could not base our definition on past test-retest variability findings because those studies investigated *current* PTSD symptoms at both times (Bovin et al., 2016) rather than current distress at T1 and *recall* of distress at T2. However, we supplemented our analyses with an RCI analysis to address this limitation. Additionally, the degree of discrepancy (inconsistency) was substantial for many participants (i.e., more than 10 points). Fifth, we did not measure participants' income, socioeconomic status, other trauma experiences (e.g., Chiu et al., 2011) or other factors (e.g., comorbid symptoms, cognitive functioning, TBI history) that may be related to PTSD severity, a limitation that should be remedied in future studies to determine the generalizability of our findings. Last, future studies could investigate whether our effects are specific to PTSD or apply to all mental health problems.

Despite these limitations, our findings have important theoretical implications because they show that people's memory of their own PTSD symptoms is not always consistent over time. More specifically, current symptom severity may influence memory reconstruction of past symptom severity.

Declarations of interest

None

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Supplementary materials

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