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Abstract

Dissociative amnesia is controversial. We tested other factors that could contribute to an inability to remember an important aspect of a traumatic event: how traumatic the event was, organic amnesia, dissociative state, childhood amnesia, expression suppression, sleep disturbance, repeated experiences, and ordinary forgetting. Trauma survivors who reported an inability to remember an important aspect of a traumatic event rated the event as traumatic as trauma survivors who reported no such inability to remember. Moreover, all cases of an inability to remember an important aspect of the traumatic event could be explained by at least one factor other than dissociative amnesia. These findings are contrary to dissociative amnesia. Compared to participants who reported no inability to remember an important aspect of the traumatic event, participants who did report an inability to remember were more likely to 1) have felt disconnected from their body during the traumatic event, which may have altered memory encoding, 2) have experienced sleep problems in the year after the traumatic event, which may have reduced memory consolidation, and 3) have experienced the traumatic event repeatedly, which may have led to less detailed memories. These findings have implications for the inclusion of dissociative amnesia in the DSM.

Keywords: posttraumatic stress disorder (PTSD), emotion, memory, dissociative amnesia, repression

Introduction

In the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), the "inability to remember an important aspect of the traumatic event (typically due to dissociative amnesia and not to other factors such as head injury, alcohol, or drugs)" is a symptom of posttraumatic stress disorder (PTSD) (American Psychiatric Association, 2013). Dissociative amnesia is similar to memory repression (Freud, 1893; Janet, 1907), as both entail that "traumatic or upsetting material is stored, becomes inaccessible because of the trauma, and can later be retrieved in intact form" (Otgaar et al., 2023; Otgaar et al., 2019, p. 1079). It has, in fact, been proposed that people cannot remember the information *because* it is too traumatic: "when emotional material reaches the point of being traumatic in intensity - something that cannot be replicated in artificial laboratories - in a certain subpopulation of individuals, material that is too intense may not be able to be consciously processed and so may become unconscious and amnesic" (Brown et al., 1998, p. 97, in McNally, 2007). Despite its inclusion in the DSM-5, dissociative amnesia is controversial and has little empirical support (Battista et al., 2023; McNally, 2007; Otgaar et al., 2019; Pope & Hudson, 2012; Rofé, 2008). Therefore, this PTSD symptom needs scrutinizing.

Although it is of course possible that someone is unable to remember certain aspects of a traumatic event, this information being forgotten *because* it is too emotionally intense (i.e., dissociative amnesia or memory repression) is unlikely (Otgaar et al., 2019). The main evidence against this notion is that emotional information is actually better remembered than neutral information (Phelps, 2004). In addition, dissociative amnesia does not seem to fit in with the rest of the PTSD symptoms. For example, the inability to remember an important aspect of the

traumatic event is the least often endorsed item in individuals with PTSD, loads only weakly on the negative alterations in cognition and mood symptom cluster, and shows poor discrimination between individuals with low and high symptom severity (McNally et al., 2017; Miller et al., 2013). Moreover, PTSD symptoms other than dissociative amnesia are vivid, intrusive memories of, nightmares about, and/or flashbacks to the traumatic event (American Psychiatric Association, 2013) and it has been shown that participants' score on the question "Do you have trouble *forgetting* any important aspects of the stressful experience?" correlates more strongly with the remaining PTSD symptoms than the score on the question "Do you have trouble *remembering* any important aspects of the stressful experience?" [emphasis added] (Berntsen & Rubin, 2014). So, it seems that PTSD is more characterized by excessive, rather than by insufficient, memory of a traumatic experience. Indeed, inhibiting the formation of memories of a traumatic event and/or reducing the emotionality of existing traumatic memories are effective treatments for PTSD (Foa, 2011; Giustino et al., 2016; Leer et al., 2014; Raskind, 2015). So, aside from information being too emotionally intense or traumatic, what other factors might contribute to the inability to remember an important aspect of a traumatic event?

One plausible factor contributing to the inability to remember an important aspect of a traumatic event is *organic amnesia*, which is memory loss caused by structural or transient brain impairment. Some causes of organic amnesia are already taken into consideration in the DSM-5, which states that in order for the inability to remember an important aspect of a traumatic event to count towards the diagnosis of PTSD it should not be due to "other factors such as head injury, alcohol, or drugs" (American Psychiatric Association, 2013, p. 145). Other potential causes of organic amnesia that are also likely to occur during a traumatic event are loss of consciousness and lack of oxygen (e.g., because of strangulation or inhalation of smoke from a

fire). Thus, organic amnesia due to various causes is a likely factor contributing to an inability to remember an important aspect of a traumatic event (see also Jelicic, 2023).

Moreover, some individuals experience a *dissociative state* during a traumatic event. Dissociation in this context means feeling disconnected from one's body, surroundings seeming unreal, dreamlike, distant, or distorted, time slowing down, or emotional numbing, for example (American Psychiatric Association, 2013; McNally, 2007). It is important to note that despite the similarity in names, a dissociative state is distinct from dissociative amnesia. That is, experiencing dissociation during a traumatic event is not the same as being unable to remember an important aspect of the traumatic event afterwards (McNally, 2007). Nevertheless, it is possible that experiencing a dissociative state during the traumatic event contributes to an inability to remember an important aspect of the traumatic event by reducing or altering the encoding of the traumatic event (Allen et al., 1999). So, a dissociative state during the traumatic event might be a factor contributing to the inability to remember an important aspect of the traumatic event.

Besides organic amnesia and dissociative state, there are other factors that could contribute to the inability to remember an important aspect of the traumatic event (McNally, 2007). First, *childhood amnesia* is the phenomenon that people typically have no episodic memories from before the age of 2 years, and only limited episodic memories from between 2-5 years of age (Newcombe et al., 2000). So, if the traumatic event happened at a young age, people may be unable to remember the event or certain aspects of it because of childhood amnesia. Second, the emotion regulation strategy *expression suppression* entails inhibiting the expression of an emotion (e.g., trying not to cry) and it has been shown to reduce memory for emotional information (Richards & Gross, 2000). Therefore, using expression suppression during the

traumatic event may be another factor contributing to the inability to remember an important aspect of a traumatic event. Third, memory consolidation happens during sleep (Born & Wilhelm, 2012) and *sleep disturbance* (e.g., difficulty falling or staying asleep or restless sleep) is a PTSD symptom (American Psychiatric Association, 2013). On the one hand, there is evidence that PTSD is associated with enhanced consolidation and reduced forgetting during sleep (Goldstein & Walker, 2014; Van der Heijden et al., 2022), which is in line with the notion that PTSD is characterized by excessive memory of a traumatic experience. On the other hand, studies have shown that shorter sleep in healthy controls and disrupted sleep in trauma survivors are associated with reduced autobiographical memory (Barry et al., 2019; Thomas et al., 2021). Those findings suggest that disrupted sleep following a traumatic event might be a factor contributing to the inability to remember an important aspect of the traumatic event. Fourth, *repeated experiences* of a traumatic event may be recalled as if they are a single instance, which may rely on schemas and, as a result, may be less detailed than the original events (Rubin & Umanath, 2015). Therefore, experiencing a certain traumatic event more than once may be a factor contributing to the inability to remember an important aspect of the traumatic event. Finally, memories may be lost or become inaccessible due to *ordinary forgetting* over time. Other researchers have discussed the phenomenon that some adult survivors of childhood sexual abuse may not have thought about the abuse for a long time, especially if they did not at the time interpret the event as sexual abuse, but may recover memories of the event later once they gain an understanding of what happened (McNally, 2007). It is important to note that here we are not referring to such delayed understanding of childhood sexual abuse, but to ordinary forgetting of important aspects of any type of traumatic event due to decay and interference instead (Sadeh et

al., 2014). In short, ordinary forgetting over time could be a factor contributing to the inability to remember an important aspect of a traumatic event.

In an important review of 128 previously described case studies of dissociative amnesia, Mangiulli et al. (2022) concluded that other factors that could have contributed to the memory loss were not properly ruled out before reaching a diagnosis of dissociative amnesia in most of the cases. Since this study analyzed previously described cases, it was not possible to consider the contribution of factors that were not included in the original report of the case. The goal of the present study was to systematically examine multiple factors that may contribute to each case of an inability to remember an important aspect of a traumatic event. The first research question of the current study is whether people who report an inability to remember an important aspect of a traumatic event rate the traumatic event as more traumatic than people who report no inability to remember, which would support the notion of dissociative amnesia. The second research question is what proportion of people who report an inability to remember an important aspect of a traumatic event endorse other factors that could contribute to the inability to remember (i.e., six causes of organic amnesia, four forms of dissociative state, childhood amnesia, expression suppression, sleep disturbance, repeated experiences, and/or ordinary forgetting over time). It is hypothesized that all participants with amnesia will endorse at least one such factor, which would support the idea that all cases of an inability to remember an important aspect of the traumatic event can be explained by factors other than dissociative amnesia. The third research question is whether there is a difference in the number of factors endorsed between people who report an inability to remember an important aspect of a traumatic event and people who report no inability to remember. It is hypothesized that people who report an inability to remember an important aspect of the traumatic event will endorse more factors than people who report no

inability to remember, which would support the notion that these factors contribute to an inability to remember an important aspect of the traumatic event. The fourth research question is which specific factors are differently endorsed by people who report an inability to remember an important aspect of a traumatic event and people who report no inability to remember. It is hypothesized that at least one of the factors will be endorsed more by people who report an inability to remember an important aspect of a traumatic event than by people who report no inability to remember, which would reveal which specific factors other than dissociative amnesia are associated with the inability to remember an important aspect of the traumatic event.

It is important to study the factors that contribute to an inability to remember an important aspect of a traumatic event for multiple reasons. First, for a proper PTSD diagnosis according to the DSM-5 it might be important to rule out all factors other than dissociative amnesia. Second, if information being highly traumatic does not actually prevent people from remembering this information, then the question arises whether dissociative amnesia should be included as a symptom of PTSD in the DSM at all. Third, dissociative amnesia is also reported outside the context of PTSD. For example, perpetrators of violent crimes sometimes claim that they do not remember committing the crime because of the extreme stress and emotions experienced (Van Oorsouw & Merckelbach, 2010). A recent study used several sophisticated lie and memory detection techniques to show that two cases of crime-related dissociative amnesia were actually malingered (i.e., feigned) (Zago et al., in press). Determining if dissociative amnesia is unlikely in people who have experienced a trauma (i.e., trauma survivors who arguably experienced more intense stress and emotions than perpetrators) will help determine if perpetrators who claim dissociative amnesia are malingering. Finally, the notion that recovering memories of the traumatic event is essential for healing is associated with the formation of false

memories through suggestive therapy (Otgaar et al., 2019). This has led to poignant examples of people ending up with traumatic memories of childhood sexual abuse that never happened, as well as prosecutions and wrongful convictions of innocent people (Burnett, 2016). More accurate knowledge of why people might be unable to remember an important aspect of a traumatic event could help avoid such harmful therapeutic approaches.

Methods

Participants

A total of 191 adult participants (students who were enrolled in an undergraduate psychology class) were recruited from the University of Missouri - St. Louis in the United States. Ethical approval was obtained from the University of Missouri - St. Louis institutional review board (project number 2046302). Participants provided informed consent by clicking on an "agree' button after reading the consent form on their computer screen. Data were collected from November 2021 until May 2022. Participants were rewarded with course credit and data collection was terminated when the Spring 2022 semester ended.

Participants could participate regardless of whether they had experienced a traumatic event, but because the current research questions concerned people with and without the inability to remember an important aspect of a traumatic event, participants who had not experienced a traumatic event (n = 22), who were unsure about whether they had (n = 27), or whose response on this item was missing (n = 1) were excluded from the current analyses. Participants who did not answer all attention-checking item correctly (see below) (n = 3) were excluded from the analyses as well. Two groups were created on the basis of the participants' self-report regarding whether they were unable to remember an important aspect of the traumatic event or not. Participants who were unsure about whether they were unable to remember an important aspect of the traumatic event (n = 23) were excluded from the analyses. Data from the complete sample will be reported elsewhere. Ultimately, 62 participants who reported an inability to remember an important aspect of the traumatic event (mean age = 25.8 years, SD = 7.7, 6 men, 55 women, 1 non-binary) and 53 participants who reported no inability to remember an important aspect of the

traumatic event (mean age = 26.6 years, *SD* = 7.6, 11 men, 41 women, 1 other gender) were included in the analyses. A sensitivity power analysis in G-Power software version 3.1.9.4 (Faul et al., 2007) revealed that the group sizes (n = 62 and n = 53) yield 80% power to detect medium effects (d = .53) in an independent samples t test with a 5% two-sided alpha level.

Procedure

Participants completed a series of questions online via Qualtrics and were allowed to skip items they did not want to answer. First, participants reported their age and gender (*man, woman, non-binary, other*). Then, participants reported whether they had experienced any traumatic event(s) involving exposure to actual or threatened death, serious injury, or sexual violence in their lifetime (*yes, no, unsure*).

If participants had experienced more than one traumatic event, they were instructed to keep only the worst traumatic event in mind, defined as the event that currently bothers them the most, when answering the subsequent questions. Then, participants reported the type of traumatic event (*natural disaster; fire or explosion; transportation accident; serious accident at work, home, or during recreational activity; exposure to toxic substance; physical assault; assault with a weapon; sexual assault; other unwanted or uncomfortable sexual experience; combat or exposure to a war-zone; captivity; life-threatening illness or injury; severe human suffering; sudden violent death; sudden accidental death; serious injury, harm, or death you caused to someone else; other*). Participants also reported how they experienced it (*happened to them directly, witnessed it, learned about it happening to a close family member or close friend, were repeatedly exposed to details about it as part of their job, other*). Participants then responded to the question "How traumatic was the event for you?" on a 1-7 scale (where 1 = *not*

traumatic at all and 7 = *extremely traumatic*). Next, participants responded to the question "Do you have trouble remembering an important aspect of the traumatic event?" (*yes, no, unsure*). The phrasing of this question (i.e., "trouble remembering") was based on item 8 of the PTSD Checklist for DSM-5 (PCL-5) (Blevins et al., 2015). The response to this question was used to create the two groups mentioned above. To assess the presence and severity of PTSD symptoms, participants completed the PCL-5 (Blevins et al., 2015) (Cronbach's alpha in the current sample = .94). The PCL-5 sum score can range from 0-80. A PCL-5 sum score of 33 or higher is taken as a provisional PTSD diagnosis (Weathers et al., 2013).

Then, participants answered a series of questions that assessed the presence of factors that may contribute to an inability to remember an important aspect of the traumatic event. To assess organic amnesia, participants reported whether they experienced head trauma (*yes, no, unsure*), unconsciousness (*yes, no, unsure*), and/or lack of oxygen (*yes, no, unsure*) during the event, whether they were under the influence of alcohol (*yes, no, unsure*) or non-prescription (e.g., illicit) drugs (*yes, no, unsure*) during the traumatic event, and whether they were using any prescription medication (*yes, namely …, no, unsure*) during the traumatic event. To assess the various types of dissociative states, participants reported whether they felt disconnected from their body (*yes, no, unsure*), whether their surroundings felt unreal, dreamlike, distant, and/or distorted (*yes, no, unsure*), whether it felt like time was slowing down (*yes, no, unsure*), and whether they felt emotionally numb (*yes, no, unsure*) during the traumatic event. To assess childhood amnesia, participants reported how old they were at the time of the traumatic event (*0-1 years, 2-5 years, 6 years or older*). To assess expression suppression, participants reported whether they tried to not let their feelings show during the traumatic event (*yes, no, unsure*). To assess sleep disturbances, participants indicated whether they regularly experienced sleep

problems, such as problems falling or staying asleep or restless sleep, in the year after the traumatic event (*yes, no, unsure*). To assess repeated experiences merging into one memory, participants indicated how often they had experienced that type of traumatic event (*once, more than once*). To assess ordinary forgetting over time, participants indicated how many years, months, and/or weeks ago the traumatic event happened.

Throughout the survey, three attention-checking items (e.g., Please select "3" to indicate that you have read this question) were included to check whether participants actually read the questions before responding. As mentioned above, participants who did not answer all three attention-checking items correctly were excluded from all analyses.

Statistical analyses

Participants with missing responses were excluded from the analyses involving the missed question(s) but were included in the other analyses. An alpha level of 5% was selected. All independent samples *t* tests were two-sided and the Levene's test was used to test the equality of variances. If the equality of variances assumption was not met, the adjusted *t*, *df*, and *p* values are reported. When an independent samples *t* test was not significant, we conducted equivalence testing by determining whether the 90% confidence interval (CI) (which corresponds to two one-sided tests) was completely between the lower (Δ_L) and upper equivalence bounds (Δ_U) (Lakens et al., 2018).

To test if there was a difference between the two groups in PCL-5 sum score and in how traumatic they rated the traumatic event, independent samples *t* tests were conducted. To test if a provisional PTSD diagnosis based on a PCL-5 sum score of 33 or higher (yes, no) was

associated with group (inability to remember, no inability to remember), a chi square test for independence was conducted.

Two variables regarding the factors that could contribute to an inability to remember an important aspect of the traumatic event were recoded. First, participants' responses regarding prescription medication use were recoded according to whether the medication reported is likely to impair memory. When at least one of the medications reported is known to impair memory (e.g., "Cymbalta", "Divalproex"), the variable was coded as *yes*. When none of the medications listed are likely to impair memory (e.g., "Bupropion", "birth control"), this variable was coded as *no*. (The variable was coded as *unsure* when participants were unsure about whether they were taking prescription medication at the time of the traumatic event, when they reported to be taking prescription medication but did not list what medication it was, or when it was unclear whether any of medications listed impair memory (e.g., "antidepressant").) Second, because only a few participants reported to be 0-1 years ($n = 2$) or 2-5 years old ($n = 6$) at the time of the traumatic event, these two categories were merged into one *5 years or younger* category.

Ultimately, there were 14 nominal variables describing possible factors contributing to an inability to remember an important aspect of the traumatic event: head trauma; loss of consciousness; lack of oxygen; alcohol; non-prescription drugs; prescription drug likely to impair memory; 5 years or younger; expression suppression; feeling disconnected from one's body; surroundings seeming unreal, dreamlike, distant, or distorted; time slowing down; emotional numbing; sleep problems; traumatic event happened more than once. To test whether participants who reported an inability to remember an important aspect of the traumatic event endorsed more of these factors than the participants who reported no inability to remember, an independent samples *t* test was conducted. To test if endorsement of each these factors (yes, no)

was associated with group (inability to remember, no inability to remember), chi square tests for independence or Fisher's exact tests (if any expected frequency was < 5) were conducted for each of the factors. *Unsure* responses were excluded from these statistical tests.

To test ordinary forgetting over time, an independent samples *t* test was conducted to test whether the traumatic event happened longer ago in the participants who reported an inability to remember an important aspect of the traumatic event than in the participants who reported no inability to remember.

Results

Trauma

The most common type of traumatic event was sexual assault, see Table 1. A total of 84 participants (73%) reported that the traumatic event happened to them, 15 participants (13%) learned about it happening to a close family member or close friend, 11 participants (10%) witnessed it, 2 participants (2%) were repeatedly exposed to details about the event as part of their job, and 3 participants (3%) selected *other*. The mean PCL-5 sum score was significantly higher in participants who reported an inability to remember an important aspect of the traumatic event (M = 19.2, SD = 16.9) than in participants who reported no inability to remember (M = 10.8, SD = 10.0), $t(94.3) = 3.2$, $p = .002$, Cohen's $d = .59$. Moreover, scoring above the PCL-5 cut off for a provisional PTSD diagnosis was significantly associated with group (inability to remember, no inability to remember), χ^2 (1, N = 109) = 7.4, $p = .006$, with 13 participants who reported an inability to remember an important aspect of the traumatic event (22% of participants in this group with no missing values on the PCL-5) scoring above the cut off, and only 2 participants who reported no inability to remember (4% of participants in this group with no missing values on the PCL-5) scoring above the cut off. So, participants who reported an inability to remember an important aspect of the traumatic event had greater PTSD symptom severity than participants who reported no inability to remember.

Factors contributing to amnesia

On average, participants rated the event as highly traumatic (M = 5.9, SD = 1.3, range = 2-7). The distribution of these scores was highly left-skewed, with most participants selecting the

extremely traumatic end point of the scale. Crucially, there was no significant difference in how traumatic participants rated the traumatic event between the participants who reported an inability to remember an important aspect of the traumatic event (M = 5.9, SD = 1.3) and the participants who reported no inability to remember (M = 5.8, SD = 1.3), $t(113) = .45$, $p = .66$, Cohen's $d = .08$. For equivalence testing, the smallest effect size of interest was set to one point on the 1-7 point rating scale. The 90% CI [-.30, .51] was completely between $\Delta_L = -1$ and $\Delta_U = 1$, which means that how traumatic participants rated the traumatic event was equivalent between the two groups. In addition, we conducted an analysis of covariance (ANCOVA) with group (inability to remember, no inability to remember) as a fixed factor and PCL-5 sum score as a covariate to control for group differences in PTSD symptom severity. The effect of the covariate was significant, $F(1,106) = 7.1$, $p = .009$, and the main effect of group on how traumatic participants rated the event was not significant, $F(1,106) < 1$, *ns*. To conclude, whether participants reported an inability to remember an important aspect of the traumatic event was not associated with how traumatic the event was and this association remained not significant when taking group differences in PTSD symptom severity into account.

All participants, regardless of whether they reported an inability to remember an important aspect of the traumatic event, endorsed at least one of the 14 nominal factors. However, the participants who reported an inability to remember an important aspect of the traumatic event (M = 5.4, SD = 1.8, range 1-11) endorsed significantly more factors that could contribute to the inability to remember than the participants who reported no inability to remember (M = 4.6, SD = 2.0, range 1-9), $t(113) = 2.3$, $p = .026$, Cohen's $d = .42$. We conducted an ANCOVA with group as a fixed factor and PCL-5 sum score as a covariate to control for group differences in PTSD symptom severity. The effect of the covariate was not significant,

$F(1,106) < 1$, *ns*, and the main effect of group on number of endorsed factors was significant, $F(1,106) = 5.4$, $p = .022$. Thus, the group difference in how many factors participants endorsed remained significant when accounting for group differences in PTSD symptom severity.

See Table 2 for the percentages of participants that endorsed each factor in either group and the statistical tests that tested whether endorsement of each factor (yes, no) was associated with group (inability to remember, no inability to remember). Every factor was endorsed by at least one participant in each group. Importantly, participants who reported an inability to remember an important aspect of the traumatic event were significantly more likely to report that they felt disconnected from their body during the traumatic event than participants who reported no inability to remember, which suggests that this particular manifestation of dissociation/depersonalization during a traumatic event contributes to the inability to remember. Likewise, participants who reported an inability to remember an important aspect of the traumatic event were significantly more likely to endorse sleep problems in the year after the traumatic event, which suggests that sleep disturbances contribute to the inability to remember. Finally, participants who reported an inability to remember an important aspect of the traumatic event were significantly more likely to have experienced the traumatic event more than once compared to participants who reported no inability to remember, which supports the idea that experiencing a traumatic event repeatedly contributes to the inability to remember an important aspect of it. To test if PTSD symptom severity differed between participants who did and did not endorse these three factors, we conducted independent samples *t* tests. Participants who felt disconnected from their body during the traumatic event had greater PTSD symptom severity ($M = 17.3$, $SD = 15.6$) than participants who did not feel disconnected ($M = 8.4$, $SD = 7.7$), $t(83.4) = 3.6$, $p < .001$. Participants who had sleep problems in the year after the traumatic event also had

greater PTSD symptom severity (M = 17.6, SD = 15.5) than participants who had no sleep problems (M = 10.2, SD = 10.9), t(80.9) = 2.7, p = .009. And also participants who experienced the traumatic event more than once had greater PTSD symptom severity (M = 18.4, SD = 15.5) than participants who only experienced it once (M = 11.5, SD = 12.7), t(106.0) = 2.5, p = .013. These result show that endorsement of those three factors was associated with PTSD symptom severity, which is not surprising because the chi square and Fisher exact tests already showed that those factors were associated with whether participants reported an inability to remember an important aspect of the traumatic event, which in turn was associated with PTSD symptom severity.

On average, the traumatic event happened 97.3 months ago (SD = 99.9, range = 0.8-516.0), which is more than eight years ago. There was no significant difference in how long ago the traumatic event had happened between the participants who reported an inability to remember an important aspect of the traumatic event (M = 105.7 months, SD = 97.3) and the participants who reported no inability to remember (M = 87.4 months, SD = 102.9), t(112) = 1.0, p = .33, Cohen's d = .18. We conducted an ANCOVA with group as a fixed factor and PCL-5 sum score as a covariate to control for group differences in PTSD symptom severity. The effect of the covariate was not significant, F(1,105) = 2.4, p = .12, and the main effect of group on how long ago the traumatic event had happened was not significant either, F(1,105) = 1.5, p = .22. So, the group difference in how long ago the traumatic event had happened remained not significant when accounting for group differences in PTSD symptom severity. For equivalence testing, the smallest effect size of interest was set to six months. The 90% CI [-12.9, 49.4] was not completely between Δ_L = -6 and Δ_U = 6, which means that how long ago the traumatic event happened was not equivalent between the two groups. So, it remains unclear whether the

inability to remember an important aspect of a traumatic event is due to ordinary forgetting over time.

Discussion

The goal of this study was to examine factors that could contribute to the inability to remember an important aspect of a traumatic event. Participants rated the traumatic event that they had experienced as highly traumatic. Importantly, participants who reported an inability to remember an important aspect of the traumatic event rated the traumatic event as traumatic as participants who reported no inability to remember. The trivially small effect size (Cohen's $d = 0.08$) of the difference between the two groups suggests that as much as 97% of the two groups overlaps in terms of how traumatic they rated the traumatic event (Magnusson, 2023). Since dissociative amnesia (and memory repression) assume that the inability to remember is related to the emotional intensity of the traumatic event (Brown et al., 1998, p. 97, in McNally, 2007; Freud, 1893; Janet, 1907), this finding is not in line with dissociative amnesia.

We examined the following factors other than dissociative amnesia that could contribute to the inability to remember for an important aspect of a traumatic event: six causes of organic amnesia (i.e., head trauma, loss of consciousness, lack of oxygen, being under the influence of alcohol, being under the influence of non-prescription (e.g., illicit) drugs, use of prescription medication likely to impair memory), four forms of dissociative state during the event (i.e., feeling disconnected from body; surroundings feeling unreal, dreamlike, distant, and/or distorted; feeling like time slowing down; feeling emotionally numb), childhood amnesia, expression suppression, sleep disturbance following the event, and experiencing the trauma repeatedly. As expected, all participants who reported an inability to remember an important aspect of the traumatic event endorsed at least one of these factors. This means that all cases of an inability to remember an important aspect of a traumatic event, at least in the current sample, could be

explained by at least one factor other than dissociative amnesia. This finding corresponds with the previous finding that none of the 128 previously documented cases convincingly described an unambiguous case of dissociative amnesia (Mangiulli et al., 2022) and provides another piece of evidence against dissociative amnesia.

Even though the DSM-5 states that the inability to remember should not be due to factors such as head injury, alcohol, or drugs to be counted towards the diagnosis of PTSD (American Psychiatric Association, 2013), other factors such as the ones included in this study and by McNally (2007) and Mangiulli et al. (2022) might need to be considered as well. Therefore, it would be beneficial to include a more comprehensive list of factors in the DSM that would need to be ruled out before diagnosing a client with dissociative amnesia. Even more strikingly, the PCL-5 item that is supposed to assess dissociative amnesia does not assess the cause of the inability to remember at all (Blevins et al., 2015), which means that it assesses an inability to remember due to any factors rather than the symptom of dissociative amnesia as listed in the DSM-5. The specificity of the PCL-5 might benefit from rephrasing this item to assess dissociative amnesia specifically.

Interestingly, even all participants who reported no inability to remember an important aspect of a traumatic event endorsed at least one of the factors, which shows that the mere presence of one factor that could contribute to an inability to remember does not predict whether a trauma survivor experiences an inability to remember an important aspect of a traumatic event. Moreover, many participants endorsed multiple factors and each factor was endorsed by at least some participants in either group. This shows that all these factors are commonly associated with traumatic events, regardless of the experience of an inability to remember an important aspect of the traumatic event. As expected though, participants who reported an inability to remember an

important aspect of the traumatic event endorsed more factors than participants who reported no inability to remember. The small-medium effect size (Cohen's $d = 0.42$) of the difference between the two groups suggests that 66% of the participants who reported an inability to remember an important aspect of the traumatic event endorsed more factors than the mean number of factors endorsed by participants who reported no inability to remember (Magnusson, 2023). This finding suggests that these factors do contribute to the inability to remember an important aspect of a traumatic event.

Specifically, participants who reported no inability to remember an important aspect of a traumatic event were more likely to have felt disconnected from their body during the traumatic event, to have experienced sleep disturbances (such as problems falling or staying asleep or restless sleep) in the year after the traumatic event, and to have experienced the traumatic event more than once. Experiencing dissociation/depersonalization during the traumatic event might contribute to the inability to remember an important aspect of the traumatic event by reducing or altering the encoding of certain aspects of the traumatic event (Allen et al., 1999). Disturbed sleep following a traumatic event might contribute to the inability to remember an important aspect of the traumatic event by impairing autobiographical memory consolidation (Barry et al., 2019; Born & Wilhelm, 2012; Thomas et al., 2021), and experiencing a traumatic event repeatedly might contribute to the inability to remember an important aspect of the traumatic event by merging the events into a single memory that relies on schemas and, as a result, is less detailed than the original events (Rubin & Umanath, 2015). There was no evidence that head trauma; loss of consciousness; lack of oxygen; being under the influence of alcohol; being under the influence of non-prescription (e.g., illicit) drugs; the use of prescription medication likely to impair memory; surroundings feeling unreal, dreamlike, distant, and/or distorted; time slowing

down, feeling emotionally numb; childhood amnesia; or the use of expression suppression during the traumatic event were specifically associated with an inability to remember an important aspect of a traumatic event. Additionally, the difference between the two groups in how long ago the traumatic event happened was neither statistically different nor statistically equivalent. The small effect size (Cohen's $d = 0.18$) of the difference between the two groups suggests that as much as 93% of the two groups overlaps in terms of how long ago the traumatic event happened (Magnusson, 2023). In short, it remains unclear whether ordinary forgetting over time is associated with an inability to remember an important aspect of a traumatic event.

This study has limitations. First, the main limitation of the study is that most of the findings were based on retrospection on an event that happened over eight years ago on average. Future, longitudinal studies could assess the presence of factors that might contribute to an inability to remember an important aspect of a traumatic event as soon as possible after the traumatic event, combined with immediate and delayed assessments of memory for important aspects of the traumatic event. Second, participants who reported an inability to remember an important aspect of the traumatic event had greater PTSD symptom severity than participants who reported no inability to remember. Where possible, we controlled for group differences in PTSD symptom severity, which did not change the conclusions about whether and how self-reported memory for the event was affected by how traumatic the event was, how many factors were endorsed, and how long ago the traumatic event had happened. More research is needed to determine if the effects of dissociative state, sleep disturbance, and/or repeated experiences on memory for the traumatic event are influenced by PTSD symptom severity. In addition, because PTSD impairs cognition and memory beyond the effect of trauma exposure (Qureshi et al., 2011), it could be that the inability to remember an important aspect of a traumatic event is just a

reflection of general cognitive issues associated with PTSD. Future studies could control for this by assessing memory for another important, but not traumatic, life event. Third, there may be other factors that could contribute to an inability to remember an important aspect of a traumatic event that were not tested. For example, the emotional trade-off effect on memory entails that people will remember the central emotional elements of an event very well at the expense of the neutral peripheral elements of that same event (Kensinger et al., 2007). Although this effect may contribute to an inability to remember an important aspect of a traumatic event, it by definition does not occur in people who report no inability to remember an important aspect of a traumatic event. Therefore, the occurrence of this factor could not be compared between trauma survivors who report an inability to remember an important aspect of a traumatic event and who report no inability to remember, which was the main analysis of this study. Future studies could test the role of the emotional trade-off effect and other factors that could contribute to an inability to remember an important aspect of a traumatic event. Finally, all participants were students who were enrolled in an undergraduate psychology class, so it would be necessary to test if the current findings generalize to a more representative sample.

To conclude, the current study adds to the notion that dissociative amnesia has little empirical support (McNally, 2007; Otgaar et al., 2019; Pope & Hudson, 2012; Rofé, 2008) as we found two kinds of evidence against dissociative amnesia. First, the inability to remember an important aspect of the traumatic event was unrelated to how traumatic the event was, and second, all cases of an inability to remember an important aspect of a traumatic event could be explained by less controversial factors. The DSM-5 already contains some information about what factors that cause an inability to remember an important aspect of a traumatic event are not to be considered dissociative amnesia, but two changes might be beneficial. First, as argued

above, a more comprehensive list of factors that would need to be ruled out before diagnosing a trauma survivor (or perpetrator) with dissociative amnesia would be needed. Second, instead of defining dissociative amnesia by what it is not, it would be more helpful to describe what it is, for example by clarifying what factor(s) do contribute to it. A clearer definition of dissociative amnesia would benefit research on this topic and would improve diagnosis and treatment of PTSD, dissociative amnesia disorder, and crime-related amnesia. And if dissociative amnesia remains without much empirical support, then it could be considered to remove it from the DSM.

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Table 1 Types of traumatic event experienced by the participants

Type of traumatic event	***n* (%)**
Sexual assault	32 (28%)
Sudden violent death	12 (10%)
Other unwanted or uncomfortable sexual experience	11 (10%)
Sudden accidental death	10 (9%)
Physical assault	10 (9%)
Transportation accident	9 (8%)
Life-threatening illness or injury	7 (6%)
Serious accident at work, home, or during recreational activity	5 (4%)
Fire or explosion	2 (2%)
Combat or exposure to war zone	2 (2%)
Serious injury, harm, or death you caused to someone else	2 (2%)
Natural disaster	1 (1%)
Assault with a weapon	1 (1%)
Exposure to toxic substance	0 (0%)
Captivity	0 (0%)
Severe human suffering	0 (0%)
Other	11 (10%)

Note. Percentages add up to ~100% because participants reported only on the worst traumatic event, defined as the event that currently bothered them the most. Percentages do not add up to 100% exactly because of rounding to the nearest whole number.

Table 2 Percentage of participants in either group that endorsed each of the 14 factors that could contribute to amnesia for an important aspect of a traumatic event and the statistical tests that tested whether endorsement of each factor (yes, no) was associated with group (inability to remember, no inability to remember)

Reason	**Inability to remember**	**No inability to remember**	**Chi square test**	**Fisher exact test**
Head trauma	7%	9%	EF < 5	$n = 111$ $p = .73$
Loss of consciousness	16%	9%	χ^2 (1, $N = 110$) = 1.5, $p = .22$	
Lack of oxygen	11%	8%	χ^2 (1, $N = 113$) = 0.5, $p = .46$	
Alcohol	13%	4%	EF < 5	$n = 115$ $p = .11$
Non-prescription (e.g., illicit) drugs	8%	6%	EF < 5	$n = 114$ $p = .73$
Prescription medication impairing memory	5%	2%	EF < 5	$n = 109$ $p = .62$
Disconnected from body	69%	55%	χ^2 (1, $N = 100$) = 4.7, ***p* = .031**	

Surroundings felt unreal, dreamlike, distant, and/or distorted	81%	76%	χ^2 (1, N = 105) = 2.5, p = .11	
Felt like time slowed down	63%	76%	χ^2 (1, N = 102) = 0, p = .90	
Felt emotionally numb	71%	66%	χ^2 (1, N = 103) = 2.4, p = .12	
5 years or younger	11%	2%	EF < 5	n = 115 p = .067
Expression suppression	60%	62%	χ^2 (1, N = 91) = 0.2, p = .67	
Regular sleep problems in the year following the event	61%	51%	χ^2 (1, N = 100) = 6.7, **p = .010**	
Repeated experience	68%	40%	χ^2 (1, N = 115) = 9.1, **p = .003**	

Note. Percentages reflect percentage endorsements out of all responses. Statistical tests only included the *yes* and *no* responses and did not include the *unsure* responses. EF < 5 indicates that a chi square test could not be performed because one or more cells had an expected frequency of less than 5. *p*s < .05 in bold.