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Autobiographical Memory Specificity in Dissociative Identity Disorder

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Abstract

A lack of adequate access to autobiographical knowledge has been related to psychopathology. More specifically, patients suffering from depression or a history of trauma have been found to be characterized by overgeneral memory, in other words, they show a relative difficulty in retrieving a specific event from memory located in time and place. Previous studies of overgeneral memory have not included patients with dissociative disorders. These patients are interesting to consider, as they are hypothesized to have the ability to selectively compartmentalize information linked to negative emotions. This study examined avoidance and overgeneral memory in patients with Dissociative Identity Disorder (DID; n=12). The patients completed the autobiographical memory test (AMT). Their performance was compared to control groups of PTSD patients (n = 26), healthy controls (n = 29), and DID simulators (n = 26). Specifically, we compared the performance of separate identity states in DID hypothesized to diverge in the use of avoidance as a coping strategy to deal with negative affect. No significant differences in memory specificity were found between the separate identities in DID. Irrespective of identity state, DID patients were characterized by a lack of memory specificity, which was similar to the lack of memory specificity found in PTSD patients. The converging results for DID and PTSD patients add empirical evidence for the role of overgeneral memory involved in the maintenance of posttraumatic psychopathology.

Autobiographical Memory Specificity in Dissociative Identity Disorder

Autobiographical memory is of fundamental significance for well-being and the sense of a coherent and consistent personal identity. Conversely, a lack of adequate access to autobiographical knowledge has been related to psychopathology. More specifically, people suffering from depression or a trauma-related disorder may fail to retrieve a specific episode (i.e., an event within a restricted time period) from memory when asked to do so (Moore & Zoellner, 2007; Williams et al., 2007). Instead, they tend to retrieve overgeneral memories like categories of events (e.g., "every time I visited my grandparents").

It is generally assumed that there are three factors that may underlie overgeneral memory, that is, Capture and Rumination, Functional Avoidance, and impaired eXecutive control (CaRFAX model; Williams et al., 2007). Especially with regard to posttraumatic reactions, functional avoidance is thought to play a role (e.g. Spinhoven, Bamelis, Molendijk, Haringsma, & Arntz, 2009). In the intentional retrieval of an autobiographical memory, people ordinarily engage in a top-down memory search through a hierarchically organized autobiographical knowledge base (see also Conway & Pleydell-Pearce, 2000). The retrieval is thought to be initiated at a general descriptive level and then move down to a more concrete level containing perceptual–sensory details of events. According to the CaRFAX model (Williams et al., 2007), overgeneral memory might arise when individuals truncate their intentional search of specifically adverse events at the general descriptive level. This way, they would avoid the intense negative affect accompanying retrieval of more specific perceptual–sensory details. The tendency to truncate retrieval may further generalize to other memory types (including positive and neutral memories), resulting in a pervasive overgeneral retrieval style (Conway & Pleydell-Pearce, 2000; Hermans, Defranc, Raes, Williams, & Eelen, 2005).

With regard to trauma-related disorders, studies so far have focused on Post-Traumatic Stress Disorder (PTSD) and have found evidence for the role of lack of memory specificity in the onset and the maintenance of this disorder (Bryant, Sutherland, Guthrie, 2007; Moore & Zoellner, 2007. In

addition, one study (Harvey, Bryant, & Dang, 1998) found evidence of overgeneral memory in Acute Stress Disorder, a diagnosis requiring the presence of dissociative symptoms in addition to the PTSD symptom-clusters of re-experiencing, avoidance, and hyperarousal within the first month after trauma. In this study, a strong link ($r = -.45$) was found between dissociative reactions and memory specificity, but not between specificity and the PTSD symptom clusters. Further examining this link between overgeneral memory and dissociative symptoms is interesting given that many theories of dissociation are based on the idea that dissociative patients have the ability to selectively forget or compartmentalize information linked to negative emotions in order to minimize distress (Cloitre, 1992; Dorahy & Huntjens, 2007). However, studies investigating the link between overgeneral memory and dissociative symptomatology, including samples with borderline personality disorder, depression, and nonclinical dissociators, yielded mixed results (Jones et al., 1999; Kremers, Spinhoven, & van der Does, 2004; Renneberg, Theobald, Nobs, & Weisbrod, 2005; Wessel, Merckelbach, Kessels, & Horselenberg, 2001). It should be noted that the studies that did not find a significant relation between dissociation and overgeneral memory relied on samples with relatively low dissociation scores. These low scores might have been responsible for a lack of empirical association. It therefore seems essential to include samples of patients with dissociative disorders in studies of overgeneral memory.

The most severe and chronic disorder in the diagnostic category of dissociative disorders is Dissociative Identity Disorder (DID). DID patients experience an extreme form of identity alteration, or the presence of two or more distinct identities or personality states which in turn take control of the person's behavior. Each of these states is considered to have its own relatively enduring pattern of perceiving, relating to, and thinking about the environment and self. These identities serve very different functions. In trauma identity states, patients focus on traumatic memories, reliving the events and engaging in defensive actions when they feel threatened. In contrast, in what is called "apparently normal" identity states, the patients do not relate the trauma to themselves. Instead, patients are thought to concentrate on daily life functioning in these states and (both consciously

and preconsciously) avoid the retrieval of traumatic memories (Reinders et al., 2006; Steele, van der Hart, & Nijenhuis, 2009).

Evidence for a particular pattern of memory retrieval across different identities comes from two case studies. In the first study, Schacter, Kihlstrom, Kihlstrom, and Berren, (1989) used an autobiographical cueing procedure. A DID patient was presented with common words (i.e., object, activity, and affect words) as retrieval cues and was asked to produce and date a memory of a specific episode from her past that was related to the cue. The patient was tested in an apparently normal identity state (i.e., the predominant identity), in which she reported no awareness of the existence of the other identities. The results indicated that the patient showed a recency bias in that she did not report memories from childhood. The authors speculated that the patient reported so few memories from childhood because at that time, the identity tested may not have 'existed' as she may have only arisen to cope with sexual abuse beginning in early adolescence. Bryant (1995) followed up on this suggestion by using a similar procedure in another DID patient, testing whether childhood memories were accessible by means of a second identity. This was a child trauma identity claiming awareness of childhood abuse for which the predominant identity reported amnesia. The results indicated that the predominant identity reported mainly recent positive memories and the child identity reported mainly negative memories from childhood. Taken together, these previous studies indicate that patients with DID report different autobiographical memories across identities, with (positive) recent memories reported in apparently normal identity states, and early negative memories reported in a trauma state. Following upon these early case studies, several more recent studies have examined memory functioning, more specifically reports of amnesia in apparently normal identity states in DID, by means of more objective memory testing (e.g., Huntjens, Verschuere, & McNally, 2012; for an overview see Dorahy & Huntjens, 2007). The results of these studies collide such that while patients in their apparently normal state may show diminished emotional reactivity in response to trauma-related information (Reinders et al., 2006), the patients' subjective reports of amnesia are not substantiated by objective testing, i.e., there is transfer of information between different identities

comparable to healthy controls. Instead, identity states in DID might show other types of differential memory functioning, including different patterns of autobiographical memory specificity. In light of the functional avoidance hypothesis of overgeneral memory, DID patients may be characterized by a lack of memory specificity especially in their apparently normal state.

The first aim of the current study was to compare memory specificity of apparently normal identity states and trauma identity states. We used the standard autobiographical memory test (AMT; Williams & Broadbent, 1986), from which indexes of autobiographical memory specificity as well as response times can be derived. Additionally, participants dated their specific memories, and rated the valence and trauma-relatedness of each specific memory. Given that different identities are considered to serve different functions, that is, avoidant responding in the apparently normal identity state and trauma preoccupation in the trauma state, we expected a tendency to retrieve fewer specific memories in the apparently normal identity state. In addition, the patients were expected to retrieve relatively neutral, non-trauma-related, recent memories in this identity state. In the trauma identity state, in contrast, patients were expected to retrieve negatively valenced, trauma-related and relatively early memories.

The performance of these different identities in DID was compared to the performance of healthy amateur actors instructed to mimic DID. The latter group was included because there is an ongoing debate about the origins of the symptoms seen in DID patients. Whereas theories of dissociation are based on the idea that the creation of alters is a defensive reaction to trauma (e.g., Dalenberg et al.; 2012, Gleaves, 1996), an alternative account argues that DID is not directly linked to trauma, but consists of multiple role enactments (Lilienfeld et al., 1999; Lynn, Lilienfeld, Merckelbach, Giesbrecht, & van der Kloet, 2012). Given this ongoing debate about the disorder, many previous studies have included a simulator group instructed to mimic task performance in different, imagined identities (e.g., Eich, Macaulay, Loewenstein, & Dihle, 1997; Huntjens, Postma, Peters, Woertman, & van der Hart, 2003; Reinders, Willemsen, Vos, Den Boer, & Nijenhuis, 2012).

We adhered to this practice by including a group of amateur actors who were asked to create two imaginary identities. One identity was to have memories of personally experienced childhood sexual abuse (denoted the trauma identity), whereas the other was instructed not to acknowledge the abuse (denoted the apparently normal identity). Just as DID patients, the simulators performed the AMT task twice, once in each identity. In their trauma state, we instructed them to retrieve memories of the trauma identity, thus including past traumatic experiences, while in their apparently normal state, we instructed them not to retrieve memories of past trauma. Simulators were not given specific information on the expected differences between identities on memory specificity, as we considered DID patients also to be unaware of these expectations. By inclusion of the simulators, we did not want to verify whether it was possible to simulate a lack of memory specificity on the basis of detailed knowledge about the AMT. Instead, we provided simulators with a description of the differential identity functions and aimed to investigate whether the creation of a trauma identity and an apparently normal identity based on this description would result in differential performance of these identities on the AMT task.

Secondly, we wanted to compare DID patients and PTSD patients. Several authors have suggested a specific diagnostic category called complex PTSD (Herman, 1992) or disorders of extreme stress not otherwise specified (DESNOS; Roth, Newman, Pelcovitz, van der Kolk, & Mandel, 1997) for patients suffering from symptoms following a history of early and chronic childhood sexual abuse. We compared similarities and differences on the AMT task performance between PTSD and DID patients. These two patient groups are suggested to be merged in this suggested joint diagnostic category of complex PTSD, but at the moment are separate diagnostic categories. The overall (i.e., across identities) DID patient performance was contrasted with that of a PTSD group consisting of patients with a comparable history of early and chronic childhood sexual abuse. We chose this group to ensure comparable severity of trauma history. Additionally, a benchmark group of healthy controls was added.

Method

Participants

Twelve female DID patients participated in the study. Controls were 31 healthy participants, 26 DID simulating participants, and 27 patients with PTSD. The PTSD patients all reported a history of repeated sexual and/or physical abuse starting in childhood. All participants were female. We recruited DID and PTSD patients from treatment settings in the Netherlands and Belgium by asking clinicians to invite patients to participate. DID or PTSD was always the primary diagnosis.

 Use of medication was allowed. The PTSD status was verified with the Clinician-Administered PTSD Scale **(**CAPS; Blake et al., 1995). The psychometric properties of this scale are excellent (Blake et al., 1995). The clinician's diagnosis of DID was verified with the Dutch version of the Structured Clinical Interview for *DSM-IV* Dissociative Disorders (SCID-D; Steinberg, 1993)**.** Boon and Draijer (1993) reported an excellent interrater reliability for presence versus absence of a dissociative disorder and for type of dissociative disorder.

The mean number of reported identities was 28 (*range* 4-39 with an exception of 196). Patients self-selected two identities for participation in the experiment, with one identity reporting awareness of a traumatic past (called the trauma identity) and the other identity reporting no memories of personally experienced trauma (called the apparently normal identity). Furthermore, the selection of identities was based on: (1) the ability to switch between identities on request; (2) the ability to perform the tasks without spontaneous switches to or interference from other identities; (3) the ability to read and write, and (4) sufficient stability to perform computer tasks.

The healthy control participants were community volunteers who responded to a newspaper advertisement. We excluded potential participants who reported any relevant memory, visual, or attention problems and control participants who reported a history of sexual and/or physical abuse

(all self-report). All healthy control participants were screened for current psychiatric disorders using the Mini-International Neuropsychiatric Interview (M.I.N.I.; Sheehan et al., 1998).

Additionally, we included 26 participants instructed to mimic DID. The simulator group consisted of female amateur actors. We showed them a documentary film[1] about a DID patient and gave them additional written information about DID. Subsequently, we asked them to create two imaginary identities. One identity had to have memories of personally experienced childhood sexual abuse (denoted the trauma identity), whereas the other was instructed not to acknowledge the abuse (denoted the apparently normal identity). Following the procedure of previous studies on DID (Huntjens, Postma, Peters, Woertman, & van der Hart, 2003; Silberman, 1985), simulators received a data sheet for the identity on which we asked them to assign a name, age, gender, physical description, personal history, and personality style of the identities. Finally, we asked them to practice switching their identities during the week preceding their participation in the experiment.

Measures

Questionnaires

Trait dissociation was measured using the *Dissociative Experiences Scale* (DES, (Carlson & Putnam, 1993)). The DES is a 28-item self-report questionnaire with scores ranging from 0 to 100. Scores above 20 or more conservatively, above 30 suggest pathological dissociation. The DES has been used in well over 200 published studies and its psychometric properties are well attested (van IJzendoorn & Schuengel, 1996). In the present sample, the DES demonstrated good internal consistency (Cronbach's α = .97).

To index trauma history, the *Traumatic Experiences Checklist* (TEC; Nijenhuis, van der Hart, & Kruger, 2002)) was included. The TEC is a self-report measure addressing the presence or absence of

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[1] i.e., parts of the documentary "Multiple personalities. The search for deadly memories" available on http://www.youtube.com/watch?v=B0LNyXsErb8.

potentially traumatizing events, focusing on emotional trauma, physical abuse, and sexual trauma. Good validity and reliability are reported (Nijenhuis et al., 2002), with Cronbach's α in the current study .92 for the total scale, which was reported in the present study.

PTSD Symptom Scale Self-Report version (PSS-SR). The PSS-SR is a 17-item measure developed by Foa, Riggs, Dancu, and Rothbaum (1993) that taps PTSD symptoms. Respondents rate the frequency of each symptom on 4-point scales ranging from 0 (not at all) to 3 (five or more times per week/almost always). As the majority of participants reported multiple traumas, questions were anchored to the trauma causing the most distress. Control participants responded to the PSS-SR in relation to the most distressing event. The English (Foa, Riggs, Dancu, & Rothbaum, 1993) and Dutch versions (Engelhard, Arntz, & van den Hout, 2007) have good psychometric properties. Cronbach's α in the current sample was .97.

We included the depression subscale of the *Brief Symptom Inventory* (BSI; Derogatis & Melisaratos, 1983). Higher scores indicate higher levels of symptom experience. The reliability, validity, and utility of the BSI have been tested in more than 400 research studies (Derogatis & Melisaratos, 1983). Cronbach's α for the 6-item depression subscale in the current sample was .95.

To measure avoidance we included a trauma-related version of the *Acceptance and Action Questionnaire* – Trauma Specific (AAQ-TS; Land, 2011) and the Posttraumatic Avoidance Behaviour Questionnaire (PABQ; van Minnen & Hagenaars, 2010). The AAQ-TS consists of 37 items referring to the avoidance of trauma-related feelings, memories, and thoughts. Example items are "If I could magically get rid of my thoughts and feelings about the trauma, I would", and "I am willing to have memories about the trauma if it means that I get to live a full life" (reverse scoring). The items are answered on a scale from 1 (never) to 7 (always). Psychometric details of this scale are not yet available. Cronbach's α in the current sample was .96.

The PABQ is a 25 item questionnaire indexing behavioral avoidance. Example items include "Since the trauma, I avoid reading trauma-related books/magazines/newspapers" and

"Since the trauma, I avoid going to bed". The respondents rate each item on a 4-point scale ranging from 1 (almost never) to 4 (almost always). The psychometric properties proved adequate (van Minnen & Hagenaars, 2010). Cronbach's α in the current sample was .95.

Material and procedure Autobiographical Memory Task (AMT)

We used a standard AMT task (Williams & Broadbent, 1986). Five positive (happy, surprised, interested, successful, safe) and five negative (clumsy, angry, sorry, hurt, lonely) words, printed on separate cards, served as memory cues. The cues were presented in a different random order for each participant, with positive and negative cues alternating. Memories were categorized according to whether they were specific or overgeneral. The latter memories were further categorized by virtue of referring to a whole class of events (categorical memories, e.g., "every time I had to sit in the basement"), memories that were overgeneral because they referred to an extended period of time (extended memories, e.g., "when I lived with my grandmother"), and semantic associates (e.g. "I am a clumsy person"). A second rater (research assistant, MA level) rated a subsample of 20 participants for specificity. The inter-rater reliability (Cohen's κ) was .72.

We informed the participants that the task was about memories about past events and that they would be shown a series of cue words and would be asked to retrieve a different, specific personal memory in response to each cue word. They were told that the event recalled could be important or trivial and recent or from a long time ago, but that it should be a specific event, something that happened to the participant at a particular place and time and lasted no longer than a day. It was emphasized that by personal memory, we meant events that they could explicitly remember rather than events that they had learned about from other sources. The experimenter provided examples of memories that would and would not qualify. The participants were informed that they had up to one minute to recall a specific memory in response to each cue word.

All participants were first asked to retrieve a specific memory in response to a maximum of 10 practice words. They were given unlimited time and prompts until they recalled at least 3 specific

memories in direct succession. Then the actual test phase started. The experimenter presented each card to the participant and said the word out loud, activating a stopwatch as soon as the word was shown. The experimenter terminated the trial as soon as the participant gave a response or until one minute elapsed, whichever came first, and recorded the time in s to respond. If the participant retrieved a memory that did not qualify, the experimenter asked: "Can you think of a specific memory? A specific event that happened on a particular day?"

Additional AMT measures

For each retrieved specific memory, we asked the participants: to date the memory, to indicate how they currently felt about the retrieved memory on a 7-point scale (1 = *very negative* to 7 = *very positive*), and to rate all retrieved specific memories for trauma-relatedness (i.e., the experiences as reported on the TEC; 1 = *not related at all* to 7 = *very much related*). DID patients performed this rating task in their host identity or another identity that was knowledgeable about the patient's trauma history. Simulators performed this task as themselves, relating the events to the traumatic index event(s) as reported by the trauma identity.

Procedure

The DID and PTSD patients were tested by the first author, while the healthy control participants and simulators were tested by research assistants. Written informed consent was obtained prior to participation. The patients were informed that the aim of the study was to understand more about trauma-related disorders. They were tested individually at their treatment centre and the test circumstances were as standard as possible (i.e., quiet test room). In the first session, they completed the written consent form, completed the diagnostic interviews, and filled in several questionnaires in a fixed order (DES, BSI, TEC, PSS-SR, PABQ, and AAQ-TS). The DID patients completed the diagnostic interviewing and the questionnaires in their "host" identity. In the second session, one week later, the patients carried out the AMT. DID patients completed the AMT twice,

once in their apparently normal identity and once in their trauma identity, with the order of identity counterbalanced across participants.

Participants in the healthy control group were told only that they were participating in an experiment on psychological complaints. To them no information was provided on the trauma- and DID-related aspects of the study. These participants completed the diagnostic screening by telephone and completed the questionnaires at home in the week prior to the experiment, which was performed at the university laboratory. The simulator participants completed the screening and questionnaires as themselves (i.e., not simulating), and the AMT task in their imagined trauma and apparently normal state. The task instruction in the apparently normal identity was to retrieve memories of events as experienced in this identity state, not including memories of trauma. In the trauma identity, the instruction was to retrieve memories of the trauma identity, thus including past traumatic experiences.

The study was approved by the Medical Ethical Committee of the University Medical Centre Groningen, The Netherlands. The current study was part of a larger study on which we reported elsewhere (Huntjens, Verschuere, & McNally, 2012)[2]. All participants received payment of 50 Euros.

Results

One control participant was unable to satisfactorily complete the practice phase (i.e., she was unable to come up with three specific memories). This participant was removed from the data. Initial inspection of the data revealed several statistical outliers. Analyses with either ex- or inclusion of these outliers yielded comparable results. One control participant was an outlier on multiple AMT measures (i.e., scored more than 2 SD from the mean on memory specificity, retrieval time, and trauma-relatedness) and was removed from the data.

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[2] The number of the control and simulator participants in the current paper (n=55) differs slightly from this previous paper (n=50). For the task described in Huntjens et al 2012, each participant was matched to a DID patient based on certain task characteristics (i.e., answers on questions about autobiographical information), as described in the paper. Also, in the current study, one additional DID patient was included who agreed to participate at a later stage.

The participants' demographics and scores on several self-report questionnaires are summarized in Table 1. For the results in this table, we report Kruskal-Wallis test results for the overall group comparison and Mann-Whitney U tests for the pairwise comparisons, given several violations of parametric test assumptions. The analyses indicated that the groups did not differ on age, χ^2 (3) = 0.85, p = .84. The groups did differ significantly on level of education, χ^2 (3) = 15.53, p = .001, with PTSD patients scoring significantly lower compared to healthy controls (U = 175.50, z = -3.80, p < .001, r = 0.51), and simulators (U = 490.00, z = 2.58, p = .01, r = 0.35). DID patients did not differ significantly from controls (U = 120.50, z = -1.86, p = .13, r = 0.29), simulators (U = 185.00, z = 0.99, p = .32, r = 0.16), nor PTSD patients (U = 210.00, z = 1.55, p = .15, r = 0.25). On the TEC, the group difference was also significant, χ^2 (3) = 59.54, p < .001. The patient groups (DID and PTSD) did not differ significantly ((U = 202.00, z = 1.22, p = .23, r = 0.20), yet, as expected, they scored significantly higher than controls and simulators (all p's < .001). This pattern was also found for DES dissociative symptoms, χ^2 (3) = 54.68, p < .001, PSS-SR posttraumatic stress symptoms, χ^2 (3) = 68.25, p < .001, AAQ-TS trauma-related experiential avoidance, χ^2 (3) = 65.77, p < .001, PABQ avoidance, χ^2 (3) = 63.51, p < .001, and BSI-depression, χ^2 (3) = 61.45, p <.001. The DID and PTSD patient groups only differed on DES dissociative symptoms, with DID patients scoring higher (U = 263.00, z = 3.07, p = .002, r = 0.49). Simulators did not differ significantly on any of the measures employed compared to control participants (p values between .13 and .84).

Autobiographical memory specificity for trauma versus apparently normal identities

The mean scores for trauma and apparently normal identities on memory specificity are presented in Table 2[3]. We first checked the extent to which responses for different identities to the same cue words overlapped. In simulators, we found an overlap in one answer out of the total of 260 cue words (i.e., 10 cue words for 26 participants). In DID patients, there was an overlap in 6 out of

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[3] Variable transformations were used where appropriate according to Tabachnick and Fidell (2007). We used a square root transformation for the memory specificity variable and trauma-relatedness rating, a log10 transformation for the mean time in s to retrieve memories. If a transformation still did not result in a normally distributed variable, nonparametric tests were performed.

the total 120 cue words (i.e., 10 cue words for each of the 12 patients). So overall, the identities differed in their responses except for a very small overlap. Comparing the DID trauma and apparently normal identities on memory specificity in a paired samples t-test revealed that the DID identities did not differ significantly on memory specificity, $t(11) = .42$, $p = .68$, $\eta^2 = .02$. The simulator trauma and apparently normal identity also did not differ significantly, $t(25) = 1.47$, $p = .16$, $\eta^2 = .08$. We found no significant differences on the number of categorical memories for the DID identities using a Wilcoxon Signed Rank Test ($z = .36$, $p = .72$, $r = .0.08$) but the difference between the simulator identities approached significance ($z = 1.72$, $p = .09$, $r = 0.24$), with the simulators retrieving more categorical memories in their trauma identity. No significant difference was found in the number of extended memories between the DID identities ($z = -0.11$, $p = .91$, $r = 0.02$) nor between the simulator identities ($z = -1.38$, $p = .17$, $r = 0.19$), and also no significant differences in the number of semantic associates between the DID identities ($z = -1.20$, $p = .23$, $r = 0.24$) and the simulator identities ($z = -1.08$, $p = .28$, $r = 0.15$).

The DID trauma identities took significantly more time to respond on the AMT task, $t(11) = 3.73$, $p = .003$, $\eta^2 = .56$, and also more time to retrieve specific memories $t(11) = 2.33$, $p = .04$, $\eta^2 = .33$ compared to the apparently normal identities. The difference between identities for the simulators on time to respond was not significant.

Comparing the DID trauma and apparently normal identities on ratings for trauma-relatedness revealed a difference approaching significance between the identities of DID patients, $t(11) = 2.07$, $p = .06$, $\eta^2 = .28$. The same pattern was found for the simulators, and with these participants the pattern was significant, , $t(25) = 5.23$, $p < .001$, $\eta^2 = .52$, with the memories of the trauma identities rated for both groups as more trauma-related when compared to the memories of the apparently normal identities. No differences between identities emerged on the valence ratings for DID patients, $t(11) = 0.58$, $p = .57$, $\eta^2 = .03$, nor for simulators $t(25) = .04$, $p = .97$, $\eta^2 < .001$. Finally, on age of the retrieved specific memories, no significant difference emerged for the DID trauma and

apparently normal identity, z = .47, p = .64, r = .11 (Wilcoxon Signed Rank Test). For the simulators, however, the difference between identities was significant, z = 3.24, p = .001, r = .45, with trauma identities dating their memories as older compared to apparently normal identities.

Autobiographical memory specificity for DID patients compared to PTSD patients and healthy controls.

The mean scores for the patient groups and controls on memory specificity are presented in Table 3. The overall Spearman's rho correlation between trait dissociation (DES) and memory specificity was -.32 (p = .009). We compared group means by way of two-way ANOVAS with participant group (PTSD, DID, and healthy controls) and level of education (low, high)[4] as factors. Given the similar performance of the apparently normal and trauma identities of the DID patients, the average of their scores were used in these analyses. We included level of education as a factor in the ANOVA analyses[5] and report significant main effects and/or interaction effects[6].

A two-way ANOVA indicated significant differences for the participant groups, $F(2, 62)$ = 5.18, p = .008, partial η^2 = .14[7]. Post-hoc comparisons[8] indicated that both PTSD patients (p = .004) as well as DID patients (p = .037) retrieved fewer specific memories than healthy controls. The patient groups did not differ significantly on memory specificity (p = .99).

On extended memories, an overall Kruskal-Wallis test indicated that the groups differed significantly, $\chi^2 (2)$ = 6.25, p = .04. On this measure, Mann-Whitney U tests indicated that PTSD

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[4] To avoid small cell sizes, we computed an ordinal variable with two values (i.e., lower to middle education level combining scores 1 to 5, and higher education level combining scores 6 and 7).

[5] Miller and Chapman (2001) advise against using a covariance analysis when covariates contain nonrandom group differences.

[6] For sake of completeness, we also performed regression analyses for the variables meeting assumptions for parametric testing (memory specificity, mean time to respond, mean time to retrieve specific memories, trauma-relatedness, and valence). In these analyses, level of education was included as a continuous variable, while dummy variables were included for the groups. These analyses revealed comparable results, except that the difference between DID patients and controls on valence approached significance, p = .074.

[7] With the inclusion of the control outlier, the results on memory specificity were $F(2,63)$ = 4.49, p = .015, partial η^2 = .13. On time to respond, the results were $F(2,63)$ = 0.38, p = .69, partial η^2 = .01. On trauma-relatedness, the results were $F(2,62)$ = 7.08, p = .002, partial η^2 = .19.

[8] We report Gabriel's pairwise comparisons tests as these are powerful in case of unequal cell sizes (Gabriel, 1969)

patients scored significantly higher compared to healthy controls U = 524.00, z = 2.31, p = .02, r = 0.31. They showed a marginally significant tendency to score higher than DID patients, U = 105.00, z = -1.79, p = .09, r = 0.29. DID patients did not differ significantly from healthy controls, U = 176.00, z = 0.06, p = .97, r = 0.009.

On categorical memories, an overall Kruskal-Wallis test indicated that the groups differed significantly, χ^2 (2) = 6.95, p = .03. Mann-Whitney U tests indicated that DID patients scored significantly higher on number of categorical memories compared to healthy controls, U = 259.50, z = 2.54, p = .013, r = 0.40, and that they tended to score higher than PTSD patients, although this difference was marginally significant, U = 217.00, z = 1.72, p = .098, r = 0.28. PTSD patients did not differ significantly from healthy controls, U = 464.00, z = 1.26, p = .21, r = 0.17.

On semantic associates, an overall Kruskal-Wallis test indicated that the groups differed significantly, χ^2 (2) = 13.40, p = .001. On this measure, Mann-Whitney U tests indicated that PTSD patients scored significantly higher than healthy controls U = 507.00, z = 2.20, p = .03, r = .29, but significantly lower compared to DID patients, U = 231.00, z = 2.21, p = .04, r = 0.35. DID patients scored significantly higher compared to healthy controls, U = 278.50, z = 3.42, p = .002, r = 0.53.

We also explored retrieval times. No significant difference between groups emerged for either the mean time to respond, $F(2,62)$ = 0.52, p = .60, partial η^2 = 0.02, or the mean time to retrieve specific memories, $F(2,61)$ = 1.07, p = .35, partial η^2 = .03.

The group comparison on ratings of trauma-relatedness for specific memories indicated a significant main effect of participant group, $F(2, 61)$ = 9.15, p < .001, partial η^2 = .23. Group comparisons indicated that PTSD patients (p < .001) and DID patients (p < .001) scored significantly higher on trauma-relatedness for their retrieved specific memories as compared to healthy controls. The difference between the DID and PTSD patients did not reach significance (p = .79).

With respect to the valence ratings of specific memories, an ANOVA indicated significant differences for the participant groups, $F(2, 61) = 5.85$, $p = .005$, partial $\eta^2 = .16$. Group comparisons indicated that PTSD patients ($p = .001$) but not DID patients ($p = .15$) rated their specific memories as more neutral (i.e., less positive) compared to healthy controls. The differences between the patient groups were not significant ($p = .64$). Finally, an overall Kruskal-Wallis test indicated that there was a marginally significant difference between the groups for mean age of the specific memory, $\chi^2 (2) = 5.67$, $p = .06$.

Discussion

We investigated memory specificity in patients with DID and patients with PTSD. We first focus on the hypothesized differential functioning on the AMT task of apparently normal and trauma identity states in patients with DID. DID patients tended to rate the memories retrieved in their trauma identity state as more trauma-related as compared to those retrieved in their apparently normal identity. Also, the DID patients were faster to retrieve specific memories in the apparently normal state. However, the faster responding in this state was a more general finding found on all retrieval trials and possibly reflected a strategy, which is fast responding in order to prevent the remembering of trauma-related memories triggered by the test cue words (Dorahy, 2001). More importantly, and in contrast to the hypothesis of differential identity responding, we did not find patients to retrieve fewer specific memories in their apparently normal identities compared to their trauma identities nor did we find any differences between identities in the type of overgeneral memories retrieved (i.e., extended, categorical, semantic associates). Also, we did not find the patients to retrieve more negative or older specific memories in their trauma states as compared to their apparently normal state. The latter finding is not in agreement with the earlier case study by Bryant (1995), in which different identities retrieved memories from different time periods. This may have been a result of different identity selection criteria. In the case study, the memory retrieval of the host identity was compared to a nine-year-old child identity, with the latter reporting older

memories compared to the host identity. In the current study, however, trauma and apparently normal identities of different ages were included (i.e., not only child trauma identities)[9].

Simulators were included in the current study because this is common practice in the field of DID study. The results indicated that simulators performed according to instructions. They retrieved more trauma-related memories in their trauma state and they dated these memories as older compared to the apparently normal state. Interestingly, the patients did not show exactly the same performance pattern as simulators (i.e., with no differences between identity states in age of the retrieved memories but faster responding on all trials in their apparently normal state). The patients thus did not seem to consciously simulate differences between identities on these measures.

Besides investigating differential identity functioning, we also wanted to compare the overall DID patient performance to that of PTSD patients. Both on self-reported avoidance and on the AMT task, the results for DID patients very much resembled those of the PTSD patients. Patients in both groups reported more experiential and behavioral avoidance compared to the healthy controls. Most importantly, on the AMT task, both patient groups showed clear evidence of reduced memory specificity and both patient groups rated their memories as more trauma-related compared to healthy controls. We thus found evidence of overgeneral memory in both PTSD patients as well as DID patients compared to controls but did not find that DID patients were characterized by a more overgeneral memory retrieval style compared to the PTSD patients.

Interestingly, we did find differences between the patient groups in the type of overgeneral memories retrieved. Specifically, the DID patients were characterized by the retrieval of significantly more semantic associates compared to the PTSD patients.In addition, they tended to retrieve more categorical memories and fewer extended memories compared to the PTSD patients. In terms of

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[9] The patients reported a mean age of 21 (SD = 13.58, range 7-49) for the selected trauma identities in this study and 32 (SD=18.31, range 7-58) for the apparently normal identities.

autobiographical memory functioning, DID patients thus seem to truncate their search at a higher, more general level, not moving down to the more concrete level of extended and then specific memories containing perceptual–sensory details of events. The PTSD patients retrieved significantly more extended memories compared to controls a well as more semantic associates.

A limitation of the current study is the relatively small DID sample size as compared to other samples in which overgeneral memory has been studied (e.g., depression, PTSD). We have partly tackled the limitation by the inclusion of control groups of adequate size. The resulting effect sizes as reported indicated medium to large effect sizes. Despite the small sample size, we believe it is important to report these results as to the best of our knowledge, this is the first study of overgeneral memory in a sample of dissociative patients and given that theoretical accounts of DID specifically emphasize the cognitive avoidance abilities in these patients.

As a second limitation, we could not adequately control for other comorbid psychopathology, most importantly depression, which is known to contribute independently to reduced autobiographical memory specificity (see Giesbrecht, Lynn, Lilienfeld, & Merckelbach, 2008). Because the control and patient groups differed significantly on this measure, controlling for depression[10] (i.e., using an ANCOVA) is not completely appropriate (see Miller & Chapman, 2001, for a thorough discussion on the use of analysis of covariance in psychopathology research). Future studies aiming to investigate the issue of comorbidity will have to include samples of patients with comorbid depression and compare those to samples without comorbid depression as diagnosed with a valid diagnostic tool.

The current results may have theoretical and diagnostic implications that speak to both the fields of trauma and dissociation, and that of overgeneral memory. To begin with the latter field, the results of the present study indicate that patients with a history of trauma are characterized by

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[10] An ANCOVA on memory specificity with the inclusion of the depression BSI score as a covariate showed a significant effect of depression, $F(1, 61) = 7.43$, $p = .008$, partial $\eta^2 = .11$, while the group effect was no longer significant, $F(2, 61) = .96$, $p = .39$, partial $\eta^2 = .03$.

reduced memory specificity. Unlike previous studies, the present study employed patients who were characterized by complex trauma (i.e., severe and repeated childhood sexual and physical trauma in combination with neglect). Second, considering the field of trauma and dissociation, the converging results in this study for the DID and PTSD patients may be taken as supportive of including both types of patients in a joint diagnostic category of posttraumatic disorders linked to disturbing memories of prolonged interpersonal trauma starting in early childhood. Overgeneral memory may be involved in the maintenance of the symptoms of such a joint diagnostic entity. Other evidence supporting the idea of such a joint category comes from studies on comorbidity of PTSD in samples of DID patients, which is very high, (i.e., between 80% and 100%). For example, in a 2011 study of 44 DID patients, 98% showed comorbid PTSD (Rodewald, Wilhelm-Gößling, Emrich, Reddemann, & Gast, 2011; see also Boon & Draijer, 1993; Ellason, Ross, & Fuchs, 1996; Middleton & Butler, 2001). DID cases without comorbid PTSD thus can be considered as rare. In the current sample, we did not systematically assess PTSD diagnostic status in the DID patients, but we did assess PTSD symptom severity on which the DID patients scored comparably to PTSD patients and above the clinical cut-off of 15 as suggested by Wohlfarth, van den Brink, Winkel, and ter Smitten (2003). The veridicality of reported trauma memories in DID, and the validity of the diagnostic distinction between the dissociative disorders and (complex) PTSD is the subject of discussion in the literature (e.g., van der Hart, Nijenhuis, & Steele, 2005). Also, the inclusion of a dissociative subtype of PTSD in the DSM-5 raises the question how and if this subtype can be distinguished from the dissociative disorders (for related empirical research see Lanius, Vermetten, Loewenstein, Brand, Schmahl, Bremner, & Spiegel, 2010; Stein et al., 2013; Wolf, Miller, Reardon, Ryabchenko, Castillo, & Freund, 2012). The results of the current study as well as previous findings of a lack of interidentity amnesia in DID (as discussed in the introduction) contribute to this discussion as they indicate similarities in symptomatology and memory functioning in DID and PTSD patients. These empirical results thus call into question the need for a separate dissociative disorders category and instead substantiate a view of a joint (complex) PTSD category ranging on a continuum from dissociative to nondissociative.

The suggestion of a combined diagnostic category for PTSD and the dissociative disorders offers an alternative view to the existing opposing theoretical views of DID. As mentioned above, many theories of dissociation are based on the idea that dissociative patients have the ability to selectively forget or compartmentalize information linked to negative emotions in order to minimize distress. The different identities are supposed to serve different functions, that is avoidant responding in the apparently normal identity state and trauma preoccupation in the trauma state. Based on this trauma view, we predicted a tendency to retrieve fewer specific memories in the apparently normal identity state. In addition, the patients in this identity state were expected to retrieve relatively neutral, non-trauma-related, and recent memories. In contrast, in the trauma state we expected patients to retrieve negatively-valenced, trauma-related and relatively early memories. The results did not agree with our hypotheses as based on the trauma view of DID, except for a marginally significant finding indicating relatively more trauma-related memories in the trauma state (as rated by the patient).

The current results do not solve the discussion regarding the etiology of DID nor the genuineness of the trauma memories as reported by these patients. Possibly, iatrogenetically created trauma 'memories' would also be related to a lack of memory specificity. This possibility may be an interesting topic for future research. Also, further studies will be needed to disentangle the transdiagnostic similarities and differences in memory retrieval between the current samples and patients with PTSD resulting from single traumatizing experiencing in adulthood, and other patients with a known history of trauma.

Additionally, in the current study we focused on functional avoidance as a possible mechanism underlying the lack of memory specificity found in patients suffering from posttraumatic complaints. However, other mechanisms such as impaired executive control may (also) be involved (Williams et al., 2007). Future studies of autobiographical memory functioning in dissociative

disorders should thus include additional measures to further investigate the mechanisms underlying overgeneral memory in this population.

In sum, the main findings in this study were that both DID patients (regardless of identity) and PTSD patients were characterized by a lack of memory specificity. For these patients, the lack of specificity will have a detrimental impact on daily life functioning including problem solving and mood repair, for which recalling related instances from the past are essential. It is in these areas that future studies can provide insight beneficial for these individuals.

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Table 1

Participants' Demographics and Median Scores (and Range) on Measures of Trauma History, Psychopathological Symptoms, and Trauma-Related Experiential Avoidance

	DID (n = 12)	PTSD (n = 27)	Controls (n = 29)	Simulators (n = 26)
Age	41.00 (22.00 – 63.00)	41.00 (22.00 – 66.00)	39.00 (25.00 – 61.00)	46.00 (22.00 – 70.00)
Level of education	6.00 (1.00 – 6.00)	5.00 (3.00 – 7.00)	6.00 (4.00 – 7.00)	6.00 (3.00 – 7.00)
TEC	13.00 (4.00 – 23.00)	11.00 (2.00 – 21.00)	2.00 (0.00 – 7.00)	1.50 (0.00- 6.00)
DES	44.64 (21.85 - 66.43)	20.36 (0.00 - 58.21)	7.14 (1.07 - 17.50)	5.18 (1.07 - 26.07)
PSS-SR	29.00 (20.00 – 49.00)	32.00 (23.00 – 48.00)	3.00 (0.00 – 17.00)	2.00 (0.00 – 15.00)
AAQ-TS	4.85 (3.35 - 5.41)	4.31 (3.03 - 5.35)	2.11 (1.16 - 3.51)	2.05 (1.05 - 2.97)
PABQ	63.00 (43.00 – 72.00)	56.00 (42.00 – 85.00)	31.00 (25.00 – 52.00)	30.50 (25.00 – 52.00)
BSI-depression	1.92 (0.67 - 4.00)	2.83 (0.67 - 4.00)	0.17 (0.00 - 1.67)	0.17 (0.00 - 1.00)

Note.   Education was assessed on a scale from 1 (low) to high (7)(Verhage, 1964). TEC = Traumatic Experiences Checklist; DES = Dissociative Experiences Scale; PSS-SR = PTSD Symptom Scale Self-Report version; AAQ-TS = trauma-related version of the Acceptance and Action Questionnaire; PABQ = Posttraumatic Avoidance Behaviour Questionnaire; BSI = Brief Symptom Inventory.

Table 2

Mean Number of Specific, Extended, and Categorical Memories, Semantic Associates, Time to Respond, Valence, Trauma-Relatedness, and Age of Retrieved Memories in the Apparently Normal t and Trauma Identity State for DID Patients and Simulators

	DID	Simulators
	(n = 12)	(n = 26)
	_____	_____
Specific Memories		
Apparently Normal Identity	4.75 (2.26)	6.38 (2.37)
Trauma Identity	5.33 (2.87)	5.88 (2.50)
Extended Memories		
Apparently Normal Identity	0.67 (1.23)	0.58 (0.70)
Trauma Identity	0.58 (0.90)	0.31 (0.62)
Categorical Memories		
Apparently Normal Identity	1.83 (1.64)	0.73 (1.00)
Trauma Identity	2.00 (1.41)	1.27 (1.25)
Semantic Associates		
Apparently Normal Identity	2.33(2.57)	0.58 (0.86)
Trauma Identity	1.33 (1.37)	0.35 (0.89)
Time (in s) to Respond		
Apparently Normal Identity	11.20 (5.09)	14.04 (7.20)
Trauma Identity	16.70 (8.07)	14.73 (6.77)
Time (in s) to Retrieve Specific Memory		
Apparently Normal Identity	10.20 (4.33)	13.79 (8.07)
Trauma Identity	14.34 (7.21)	15.30 (10.97)

Valence		
Apparently Normal Identity	4.57 (1.27)	4.34 (.70)
Trauma Identity	4.22 (1.34)	4.35 (1.11)
Trauma-Relatedness		
Apparently Normal Identity	3.12 (1.69)	2.91 (1.73)
Trauma Identity	4.25 (1.66)	4.99 (1.54)
Age of Memory (in Years)		
Apparently Normal Identity	11.54 (15.73)	7.75 (9.62)
Trauma Identity	10.26 (15.56)	18.02 (15.00)

Table 3

Mean Number of Specific, Extended, and Categorical Memories, Semantic Associates, Time to Respond, Valence, Trauma-Relatedness, and Age of Retrieved Memories for DID Patients, PTSD patients, and Controls.

	DID (n = 12)	PTSD (n = 27)	Controls (n = 29)
Specific Memories	5.04 (2.12)	4.93 (2.27)	6.83 (1.81)
Extended Memories	0.63 (0.71)	1.26 (1.06)	0.66 (0.77)
Categorical Memories	1.92 (1.29)	1.19 (0.96)	0.90 (0.98)
Semantic Associates	1.83 (1.57)	0.78 (0.85)	0.34 (0.72)
Time (in s) to Respond	13.95 (6.09)	14.98 (6.86)	13.19 (6.61)
Time (in s) to Retrieve a Specific Memory	12.27 (5.07)	14.76 (6.85)	12.29 (6.16)
Valence	4.40 (0.78)	4.11 (0.90)	4.93 (0.67)
Trauma-Relatedness	3.59 (1.34)	4.00(1.56)	1.94 (0.85)
Age of Memory (in Years)	10.90 (15.12)	5.61 (6.77)	2.87 (2.80)