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Is it Trauma- or Fantasy-based? Comparing dissociative identity disorder, post-traumatic stress disorder, simulators, and controls

Vissia EM, Giesen ME, Chalavi S, Nijenhuis ERS, Draijer N, Brand BL, Reinders AATS. Is it Trauma- or Fantasy-based? Comparing dissociative identity disorder, post-traumatic stress disorder, simulators, and controls.

Objective: The Trauma Model of dissociative identity disorder (DID) posits that DID is etiologically related to chronic neglect and physical and/or sexual abuse in childhood. In contrast, the Fantasy Model posits that DID can be simulated and is mediated by high suggestibility, fantasy proneness, and sociocultural influences. To date, these two models have not been jointly tested in individuals with DID in an empirical manner.
Method: This study included matched groups [patients (n = 33) and controls (n = 32)] that were compared on psychological Trauma and Fantasy measures: diagnosed genuine DID (DID-G, n = 17), DID-simulating healthy controls (DID-S, n = 16), individuals with post-traumatic stress disorder (PTSD, n = 16), and healthy controls (HC, n = 16). Additionally, personality-state-dependent measures were obtained for DID-G and DID-S; both neutral personality states (NPS) and trauma-related personality states (TPS) were tested.
Conclusion: For Trauma measures, the DID-G group had the highest scores, with TPS higher than NPS, followed by the PTSD, DID-S, and HC groups. The DID-G group was not more fantasy-prone or suggestible and did not generate more false memories. Malingering measures were inconclusive. Evidence consistently supported the Trauma Model of DID and challenges the core hypothesis of the Fantasy Model.

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Key words: dissociative identity disorder; post-traumatic stress disorder; patient simulation; etiology

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Significant outcomes

- Patients with diagnosed genuine dissociative identity disorder (DID) were not more fantasy-prone or suggestible and did not generate more false memories compared with the other groups.
- Furthermore, a continuum of trauma-related symptom severity was found across the groups.
- This continuum supports the hypothesis that there is an association between the severity, intensity, as well as the age at onset of traumatization, and the severity of trauma-related psychopathology.
- Evidence consistently supports the Trauma Model of DID and challenges the core hypothesis of the Fantasy Model.

Limitations

- A limitation of our study is the modest sample sizes.
- The lack of parallel data in the group comparisons and the dissociative-personality-state comparisons is another limitation.
- Finally, only female DID participants and controls were studied.

Introduction

The dissociative disorders (DD) are placed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (1) next to the trauma- and stressor-related disorders (TSRD) section to indicate links between these categories (2). This placement is based on the discovery of a dissociative subtype of post-traumatic stress disorder (PTSD) (3–6). PTSD and dissociative identity disorder (DID) are included in sections of TSRD and DD, respectively, which suggests a close relationship between them. Despite the inclusion of DID in the DSM since 1980 and studies on reliability and validity of the diagnosis (7–9), DID is viewed as a controversial diagnosis by skeptics who debate its diagnostic validity and etiology (10, 11).

The *Trauma Model* (12) posits that DID is a severe trauma-related disorder, typically with comorbid PTSD (8), and is related to early childhood traumatization including factors such as disorganized attachment, chronic neglect, and abuse. Empirical research in individuals with DID has been relatively scarce (12–15), but accumulated findings support a *Trauma Model* (12) of dissociation and DID, which is sustained by recent neurobiological studies (16–21).

In contrast, the *Fantasy Model* (12), also referred to as the sociocognitive (22) or non-trauma-related model (23), posits that dissociation and DID are related to enactment, sleep disturbances, suggestive psychotherapy, and/or sociocultural influences and are mediated by high suggestibility and fantasy proneness. The Fantasy Model states that DID can easily be simulated, but several studies comparing DID simulators to individuals with genuine DID have found that groups can be distinguished, contradicting the Fantasy Model (19, 20, 23–27). On the other hand, some studies examining differences on psychological measures found that DID-simulating healthy controls can imitate some of the most obvious and well-known symptoms associated with DID such as psychoform dissociation, including phenomena such as amnesia, loss of control, and identity confusion, yet simulators fail to adequately present the subtle and less well-known symptoms and associated features of DID (24, 26, 27). For example, a measure of symptom over reporting was best able to discriminate simulated DID (27). Thus far, these studies have provided support for the validity of DID as a diagnosis that cannot be easily imitated on psychological testing.

While a dichotomization between the Trauma Model and Fantasy Model is often made, and in the literature there is a precedent for this dichotomy (12, 28, 29), it is over simplifying constructs that have some overlap. Dissociative phenomena related to traumatization and dissociative phenomena related to fantasy are not discrete categories; for example, traumatized individuals may use fantasy to cope with traumatizing events and the aftermath of trauma (12, 30, 31). Generating and maintaining dissociative personality states includes a degree of imagination that, as human existence is sociocultural in nature, will be inescapably affected by social and cultural factors (21). This does not mean that such influences are the primary causes of core features of dissociative personality states (21). Dalenberg et al. (12) (p. 562) also recognized this and cited research showing that traumatized children often rely on fantasy and imagination to pretend they are not being abused. Reinders et al. (23) previously described that proponents of the Trauma Model recognize that some features of dissociative identity states can be influenced by sociocultural factors, that false positive cases of DID have evolved in treatment settings, and that some psychiatric patients imitate DID (32). However, the level of fantasy proneness in individuals with DID is comparable to healthy controls (23) (Appendix S1–S5) and lower than in patients with borderline personality disorder, a disorder that Fantasy Model proponents do not argue is related to fantasy proneness (33).

Dalenberg et al. (12) reviewed the evidence for both the Trauma Model and Fantasy Model in controlled studies with children and adults, and in community and clinical samples. They concluded that when fantasy proneness is controlled for, pathological dissociation is still predictive of a trauma history. They found little support for the assertion that the dissociation–trauma relationship is due to suggestibility or confabulated memories of trauma. Proponents of the Fantasy Model countered that Dalenberg et al. leaped too quickly from correlational data to causal conclusions and that they did not adequately consider the lack of corroboration of abuse in many studies (28). Despite the descriptive nature of literature reviews, they are of pivotal importance for the Trauma vs. Fantasy debate (10, 12) because empirical research testing the Trauma vs. Fantasy Model in one comprehensive design, for example, comparing individuals with genuine DID to a matched trauma group, such as PTSD, on the one hand and a DID-simulating healthy control group on the other hand, is currently lacking. This study therefore aimed to compare these groups on a variety of questionnaires and explore which theoretical model receives the most support.

Our study compares individuals with diagnosed genuine DID (DID-G) to a 'Trauma' and a

'Fantasy' control group and includes a non-simulating study-blind group of healthy controls (HC) as well. Including individuals with PTSD allows us to compare the impact of relatively 'simple' traumatization with the assumed early and chronic traumatization in DID-G, while including DID-simulating healthy controls (DID-S) without trauma exposure allows us to disentangle the possible role of simulation in DID. Incorporation of such control groups enables us to broadly test the Trauma vs. Fantasy Model on a wide range of symptom and trauma measures. A variety of measures, using self-report questionnaires, were obtained as part of the Dutch Neuroimaging DID project (www.neuroimaging-DID.com) (16, 18, 34) in these four groups. In the first part (Part 1) of the study, the DID-S group participated as their normal non-simulating selves and participants in the DID-G group were asked to complete questionnaires in the dissociative personality state that primarily fulfills tasks in daily life, hence as a neutral personality state. In DID, following the terminology of the DSM-5 (1) and Reinders et al. (35), and the conceptualization of Van der Hart et al. (36), at least two prototypical dissociative personality states can be distinguished: a neutral personality state (NPS) in which trauma memories are experienced with some degree of dissociative amnesia and/or without concurrent emotional and somatic responses due to the perception that these traumatic events were not personally experienced, and a trauma-related personality state (TPS) in which traumatic memories are experienced as personal memories with emotional and somatic responses to trauma cues. Investigating dissociative-personality-state differences on trauma- and fantasy-related measures allows us, for the first time, to assess core diagnostic features of DID and provide a more detailed clinical profile of DID in comparison with PTSD, DID-S and HC. In the second part (Part 2) of the study, the DID-G group participated in both an NPS and TPS, and the DID-S group simulated both an NPS and TPS.

Hypotheses Part 1: If the Trauma Model is correct, the *between-group* comparisons (DID-G vs. PTSD, DID-S, and HC) will show that individuals with DID-G score higher on trauma-related variables, including somatoform and psychoform dissociation, anxiety, and depersonalization, than any other group; the PTSD group will have scores in between those of the DID-G, DID-S, and HC groups on variables related to trauma; and the DID-S and HC will have the lowest scores on all the measures. If the Fantasy Model is correct, individuals with DID-G will score higher than the comparison groups on variables related to fantasy and suggestion, such as fantasy proneness, suggestibility, 'creative experiences', and malingering.

Hypotheses Part 2: To test the Trauma Model and Fantasy Model with respect to DID-G's *dissociative-personality-state differences*, the DID-S group participated in both a simulated NPS and a simulated TPS to provide a comparison for the NPS and TPS of the DID-G group. A control group was created by including HC to provide a comparison for the NPS of the DID-G group and including individuals with PTSD to provide a comparison for the TPS of the DID-G group. This created a 3-by-2 factorial design (i.e. three groups, two dissociative personality states). For the *dissociative-personality-state differences* comparisons, we hypothesized that if the Trauma Model is correct, then dissociative-personality-state-dependent differences between the DID-G, DID-S, and control groups will be found. If the Fantasy Model is correct, the DID-S' simulated personality states will not be distinguishable from the DID-G's dissociative personality states.

Aims of the study

The study aimed to compare psychological test data from two patient groups and two control groups to examine whether the Trauma or Fantasy Model fits the findings best. If the Trauma Model is correct, patients with dissociative identity disorder should have higher scores for trauma-related measures (such as dissociative symptoms and reported adverse events) than patients with post-traumatic stress disorder, healthy controls, and individuals simulating dissociative identity disorder. If the Fantasy Model is correct, patients with dissociative identity disorder should have higher scores for suggestibility and false memories.

Material and methods

Participants

Participants were females between 18 and 65 years, as only female individuals with dissociative identity disorder (DID) volunteered to participate, and native Dutch speakers. Four groups of participants were recruited: women with diagnosed genuine DID (DID-G; $n = 17$), DID-simulating healthy controls who simulated DID in Part 2 of the study (DID-S; $n = 16$), women with post-traumatic stress disorder (PTSD; $n = 16$), and healthy controls (HC; $n = 16$).

Dissociative identity disorder. Individuals with DID-G were recruited from mental health care

institutions across the Netherlands and via advertisements and appeals on Internet fora. The diagnosis of DID was assessed by DID experts (E.N. or N.D.) using the Structural Clinical Interview for DSM-IV Dissociative Disorders (37) [SCID-D; Dutch translation (38)].

In consultation with their therapists, individuals with DID-G decided which neutral personality state (NPS) and trauma-related personality state (TPS) (39) would participate for measures obtained in Part 2 of the study. Therapist and patient provided descriptions of these dissociative personality states and researchers E.V. and M.G. confirmed that the selected personality states met the inclusion criteria of the study, meaning that TPS had access to trauma-related memories, whereas NPS mentally avoided these memories (23, 35, 39). Fourteen individuals with DID-G participated in both NPS and TPS; three individuals with DID were only able to participate as NPS because they were unable to alternate voluntarily between NPS and TPS on request in a research setting. For definitions of dissociation, see Appendix S1 online, and for comorbidity and a description of the dissociative personality states, see Appendix S2 and Table S1.

Control subjects. Participants in the three control groups (DID-S, PTSD, and HC) were matched with DID-G on age, education level, gender, and ethnicity. Exclusion criteria for DID-S and HC were as follows: the presence of dissociative symptoms, as determined with the Dissociative Experiences Scale (DES cutoff >25) (40) and Somatoform Dissociation Questionnaire (SDQ-20 cutoff >28; SDQ-5 cutoff >7) (41, 42), a high score on the Traumatic Experience Checklist (TEC impact >2) (43), high levels of general anxiety on the State-Trait Anxiety Inventory-Trait scale (STAI-T) (44), alcohol or drug abuse, or neurological or mental illness in the past or at present. Exclusion criteria for PTSD were alcohol or drug abuse, or neurological or mental illness in the past or at present.

DID-simulating controls were recruited from acting schools, through advertisements on the website www.theaternetwerk.nl, magazines, and newspapers. All actors had at least 2 years experience with acting. After completing an online questionnaire to screen for inclusion criteria, the actors received additional information required for simulation of DID-G in the study. The simulation protocol was based on an established and successful protocol (45), which has been recognized as being rigorous (46) (see Appendix S3 online). The actors simulating DID were asked to simulate two dissociative personality states consistent with an NPS and TPS as seen in individuals with DID (19–21, 23, 36). To prepare them for their participation, DID-S participants received written instructions, a documentary about DID (47), and the movie Sybil (48) that tells a story about a woman who suffers from DID. To make sure they were able to accurately portray DID, DID-S participants were asked to fill in a form with information about the two dissociative personality states they created, which allowed investigators (E.V. or M.G.) to check whether the phenomena related to DID were fully understood. For a description of these states, see Appendix S2 and Table S1 online for an overview.

PTSD was diagnosed by the researchers E.V. and M.G. using the Clinician-Administered PTSD Scale (49, 50) (CAPS; Dutch translation, KIP (51); mean CAPS score of 61.25 [± 14.07]). All included individuals with PTSD had experienced interpersonal trauma, which was required to represent a mild version of the interpersonal trauma common in DID. Eleven of the PTSD patients reported multiple types of interpersonal traumatizing events during childhood ($n = 6$) or starting from childhood and continuing into adult life ($n = 5$). The remaining 5 PTSD patients reported traumatizing events only during adulthood.

Healthy controls were informed that they would participate as a control group in a study investigating autobiographical memory processing in the brain. They were not informed about the characteristics of the other groups.

Protocol

After reading a description of the study all participants gave written informed consent according to procedures approved by the Medical Ethical Committee (METc) of the University Medical Centre Groningen (UMCG) and the Amsterdam Medical Centre (AMC). The study is part of the larger Dutch Neuroimaging DID study and was approved by the Ethical Committee of both centers.

Part 1 of the study allowed us to test *group differences*. Online questionnaires were administered to individuals in the DID-G (as an NPS), DID-S, PTSD, and HC groups. Participants in the DID-S and HC groups responded truthfully as themselves to fit the timeline of the larger neuroimaging study protocol and to assess that they were truly mentally healthy controls. Although it can be argued that the DID-S participating in Part 1 of the study as their normal non-simulating selves is a specific subsample of HC, we did not merge the two groups as the inclusion process was different. The HC were included from the general

population, whereas the DID-S were recruited from the smaller population of actresses.

Part 2 of the study allowed us to test additional *dissociative-personality-state differences* within and between the DID-G and DID-S (in their simulated roles) groups, who completed the battery of questionnaires twice, both as NPS and TPS. The order in which dissociative personality states participated was counterbalanced. Individuals with PTSD and HC completed the questionnaires once.

Questionnaires

The main questionnaires were divided into two categories: Trauma and Fantasy. In addition, two other questionnaires of interest were included. Within the Trauma category, a division was made between symptom measures and retrospective measures. Symptom measures of trauma assess current trauma-related symptomatology. These measures are considered to have higher reliability than retrospective trauma measures, and therefore, a division is made. For a detailed description and motivation of all questionnaires, see Appendix S4 and Table S2 online. All instruments had good reliability and validity as is also described in Appendix S4 online. We investigated and report the overlap in trauma and fantasy measures in Appendix S5 online.

Trauma model. *Symptom measures*. In Part 1 of the study, the following Trauma Model measures were obtained: The frequency of dissociative experiences was assessed with the Dissociative Experiences Scale (DES) (40), the severity of somatoform dissociation was measured with the Somatoform Dissociation Questionnaire (SDQ-20) (41), emotional aspects of anxiety targeted to the individual's general and long-standing anxiety level were assessed with the State-Trait Anxiety Inventory-Trait scale (STAI-T) (44), and the frequency and duration of depersonalization symptoms were measured with the Cambridge Depersonalization Scale (CDS) (52). In Part 2 of the study, the current level of depression was measured with the Beck Depression Inventory (BDI) (53).

Retrospective trauma exposure and attachment. In Part 1 of the study, the following retrospective trauma measures were obtained: The types of trauma together with the age of occurrence and duration were measured with the Traumatic Experience Checklist (TEC) (43) and care and protection from father and mother were measured with the Parental Bonding Instrument (PBI) (54). In Part 2 of the study, the frequency of maltreatment experiences during childhood was assessed using the Childhood Trauma Questionnaire (CTQ) (52, 55).

Fantasy model. *Symptom measures*. In Part 1 of the study, the following Fantasy Model measures were obtained: Sleeping and dreaming experiences or disturbances were measured with the Iowa Sleep Experiences Scale (ISES) (56), fantasy proneness was measured with the Creative Experiences Questionnaire (CEQ) (57), and malingering of psychiatric symptoms and/or cognitive impairments were measured with the Structured Inventory of Malingering Symptoms (SIMS) (58, 59). In Part 2 of the study, the fantasy instruments included: interrogatory suggestibility as measured with the Gudjonsson Suggestibility Scale (GSS) (60) and the tendency to create false memories as measured with the Deese–Roediger–McDermott (DRM) (61, 62).

Other measures. In Part 2 of the study, the Vragenlijst Kenmerken Persoonlijkheid (VKP; Questionnaire Personality Characteristics) (63) was included to assess personality disorders characteristics because DID has high comorbidity levels with axis II disorders (64). The Positive and Negative Syndrome Scale (PANSS) (65) measures symptom severity related to schizophrenia and was included as overlap between psychotic and dissociative disorders has been described (66–68) and differentiating between diagnoses can be challenging.

Statistical analyses

Data were analyzed using IBM SPSS Statistics for Windows, Version 20.0. (IBM Corp., Armonk, NY, USA). Time between Part 1 and Part 2 of the study was on average 6.5 weeks (SD 7.6), and therefore, measures can be considered to be independent and separate multiple-comparisons corrections were conducted for Part 1 and Part 2 of the study. For the analyses of the questionnaires obtained in Part 1 of the study, one-way ANOVAS were used. We applied nonparametric Kruskal–Wallis tests and (post hoc) Mann–Whitney tests when the data did not meet the assumptions of normal distribution or heterogeneity of variance (assessed with Levene's test). For Part 1, Bonferroni multiple-comparisons correction was applied: P-value 0.05/# of questionnaires (9) = P-value ≤ 0.0056. P-value < 0.01 is reported as a trend. Post hoc correction was applied: P-value 0.05/# of comparisons (4) = P-value ≤ 0.0125. P-value < 0.05 is reported as a trend. Statistical tests were two-tailed.

For the analyses of the questionnaires obtained in Part 2 of the study, the factors Group [DID-G

(i), DID-S (ii) and controls (iii)] and Personality State (PS: (simulated) NPS and TPS) were tested in a repeated measures ANOVA design. Post hoc *t*-tests assessed within- and between-group personality-state differences, only when a significant main or interaction effect was found. Main effects of Group and PS were assessed as well as interaction effects for Group × PS. For Part 2, Bonferroni multiple-comparisons correction was applied: *P*-value 0.05/# of questionnaires (6) = *P*-value 0.0083. *P*-value < 0.01 is reported as a trend. Post hoc correction was applied: *P*-value 0.05/# of comparisons (2) = *P*-value ≤ 0.025. *P*-value < 0.05 is reported as a trend. Statistical tests were two-tailed.

Results

Table 1 provides an overview of the main findings from the trauma, fantasy, and other measures in this study.

Part 1: group comparisons

Table 2 shows the results [mean and standard deviation (SD)] of statistical analyses on the questionnaires obtained in Part 1 of the study. DID-G, DID-S, PTSD, and HC groups did not significantly differ with respect to age and education (see top part of Table 2).

Trauma model. Does DID-G differ from PTSD and healthy controls on trauma symptom measures?. For the dissociation [Dissociative Experiences Scale (DES) and Somatoform Dissociation Questionnaire (SDQ-20)], anxiety [State-Trait Anxiety Inventory-Trait (STAI-T)] and depersonalization [Cambridge Depersonalization Scale (CDS)] measures, significant differences ($P < 0.001$) between the groups were found. Post hoc tests revealed that the DID-G group showed higher scores compared with DID-S, PTSD, and HC groups ($P < 0.001$) with the exception of the anxiety measure in which DID-G and PTSD groups did not differ significantly from each other. Individuals with PTSD reported significantly higher ($P < 0.001$) symptom scores when compared with HC.

Does DID-G differ from PTSD and healthy controls on retrospective trauma exposure and attachment difficulties?. For the traumatic experiences measure [Traumatic Experience Checklist (TEC)] and the parental bonding measure [Parental Bonding Instrument (PBI)], significant differences ($P < 0.001$) between groups were found for DID-G, DID-S, PTSD, and HC on Total and subscales. Post hoc tests showed that the DID-G group scored significantly higher compared with the DID-S, PTSD, and HC groups ($P < 0.01$) with the exception of the lack of maternal care subscale on the PBI, in which the DID-G and PTSD group did not differ significantly. Individuals with PTSD and HC did not differ on the PBI scores.

Fantasy model. Does DID-G differ from PTSD and healthy controls on fantasy symptom measures?. For the sleep disturbances measure [Iowa Sleep Experience Survey (ISES)], significant group differences ($P < 0.001$) were found for the General sleep scale, with significantly higher scores for the DID-G group as compared with the DID-S and HC groups ($P < 0.001$). Post hoc testing revealed no differences for this scale between the DID-G and PTSD groups. Individuals with PTSD reported significantly higher scores compared with HC ($P < 0.001$). No significant group differences were found for the Lucid dreams scale.

A trend was found for group differences for the fantasy proneness measure [Creative Experiences Questionnaire (CEQ)]. Post hoc tests showed that the DID-G group scored significantly higher compared with HC ($P < 0.01$), but no differences were found comparing the DID-G group to the DID-S or PTSD groups. The PTSD group scored higher significantly than HC ($P < 0.01$).

For the malingering measure [Structured Inventory of Malingered Symptomatology (SIMS)], significant differences ($P < 0.001$) were found for Total SIMS score and all subscales except for the Low intelligence subscale. Further post hoc testing showed that for the Total score, and the Neurologic, Affective, Psychosis, and Amnesia subscales, significant differences ($P < 0.001$) existed for the DID-G group compared with the DID-S or HC group, with higher scores for the DID-G group. In comparison with the PTSD group, individuals with DID-G scored significantly higher ($P < 0.01$) on the Total score and the Neurologic, Psychosis, and Amnesia subscales, but the two groups did not differ on the Affective scale. Individuals with PTSD showed significant higher scores ($P < 0.01$) on the Total score and Affective subscale only, when compared with HC.

Part 2: dissociative-personality-state-dependent group comparisons

Table 3 shows the results (mean and SD) of statistical analyses on the questionnaires obtained in Part 2 of the study.

Trauma model. Do dissociative personality states in DID differ on trauma symptom measures compared

Table 1. Main results of the study

DID: Trauma or Fantasy? Comparison between groups and personality states

Part 1 of the Study
Group comparisons between DID-G, PTSD, DID-S, and HC, with DID-G and DID-S as their normal selves

Measures	Most important findings	FM or TM
Demographics		
Age & Education	No group differences	x
Trauma		
Symptom measures		
Dissociation (DES)	DID-G > DID-S	TM
Somatoform dissociation (SDQ-20)	DID-G > PTSD	
Anxiety (STAI-T)	DID-G > HC	
Depersonalization (CDS)	PTSD > HC	
Retrospective trauma measures		
Traumatization (TEC)	DID-G > DID-S	TM
	DID-G > PTSD	
	DID-G > HC	
	PTSD > HC	
Parental bonding (PBI)	DID-G > DID-S	TM
	DID-G > PTSD†	
	DID-G > HC	
	PTSD = HC	
Fantasy		
Fantasy-related symptom measures		
Sleep disturbances general (ISES)	DID-G > DID-S	TM
	DID-G > HC	
	DID-G = PTSD	
	PTSD > HC	
Lucid dreams (ISES)	No group differences	TM
Fantasy proneness (CEQ)	DID-G = DID-S	TM
	DID-G = PTSD	
	DID-G > HC	
	PTSD > HC	
Malingering total (SIMS)	DID-G > DID-S	FM and TM
	DID-G > PTSD	
	DID-G > HC	
	PTSD > HC	

Part 2 of the Study
DID-G in two personality states vs. DID-S in two personality states vs. PTSD and HC

Measures	Most important findings	FM or TM
Trauma		
Trauma-related symptom measures		
Depression (BDI)	DID-G > DID-S	TM
	DID-G > PTSD/HC	
	TPS > NPS	
Retrospective trauma measures		
Childhood trauma CTQ	DID-G > DID-S	TM
	DID-G > PTSD/HC	
	TPS > NPS	
Fantasy		
Fantasy-related symptom measures		
Suggestibility total (GSS)	No group differences	TM
Recall	DID-G < DID-S	TM
	DID-G < PTSD and HC	
	NPS > TPS	
False memories (DRM)	No group differences	TM
Recall	DID-G < DID-S	TM

Table 1. (Continued)

Part 2 of the Study
DID-G in two personality states vs. DID-S in two personality states vs. PTSD and HC

Measures	Most important findings	FM or TM
Other measures		
Personality characteristics (VKP)	DID-G vs. DID-S	TM
	DID-G > PTSD and HC	
	TPS > NPS	
Psychotic symptoms (PANSS)	DID-G > DID-S‡	TM
	DID-G > PTSD and HC	
	TPS > NPS	

DID-G, dissociative identity disorder-diagnosed genuine patients; DID-S, DID-simulating healthy controls; PTSD, post-traumatic stress disorder; HC, healthy controls; TM, trauma model; FM, fantasy model; NPS, neutral personality state; TPS, trauma-related personality state; DES, Dissociative Experiences Scale; SDQ, Somatoform Dissociation Questionnaire; STAI-T, State-Trait Anxiety Inventory-Trait; CDS, Cambridge Depersonalization Scale; TEC, Traumatic Experiences Questionnaire; PBI, Parental Bonding Instrument; ISES, Iowa Sleep Experiences Survey; CEQ, Creative Experiences Questionnaire; SIMS, Structured Inventory of Malingering Symptoms; BDI, Beck Depression Inventory; CTQ, Childhood Trauma Questionnaire; GSS, Gudjonsson Suggestibility Scale; DRM, Deese–Roediger–McDermott; VKP, Vragenlijst voor Kenmerken van de Persoonlijkheid (Questionnaire on Personality Traits); PANSS, Positive and Negative Syndrome Scale.

†Except for mother care subscale.

‡For total and positive subscale.

with simulated DID and controls?. On the depression measure [Beck Depression Inventory (BDI)], the DID-G group showed significantly higher scores compared with the DID-S and control groups ($P < 0.001$), as reflected in both a significant main effect of group as in significant post hoc comparisons. In all groups, (simulated) trauma-related states showed significantly higher levels of depression compared with (simulated) neutral states ($P < 0.001$).

Do dissociative personality states in DID differ on retrospective trauma exposure measures compared with simulated DID and controls?. For the childhood trauma measure [Childhood Trauma Questionnaire (CTQ total)], main effects of group and post hoc tests showed significantly higher scores ($P \leq 0.001$) for the DID-G groups as compared with the DID-S and control groups, indicating greater trauma exposure in individuals with DID-G. For all subscales, that is, Emotional Abuse, Emotional Neglect, Physical Abuse, Physical Neglect, and Sexual Abuse, significant main effects of Personality State and Group were found ($P < 0.001$), as well as post hoc differences, with higher scores in DID-G as a group and TPS as the personality state.

Table 2. Results of Anova of part 1

					ANOVA/Kruskal–Wallis		Post hoc *P*-values			
	DID-G (n = 17)	DID-S (n = 16)	PTSD (n = 16)	HC (n = 16)	Statistic	*P*-value	DID-G vs. DID-S	DID-G vs. PTSD	DID-G vs. HC	PTSD vs. HC
Demographics										
Age (years)	43.88 (9.86)	40.51 (12.94)	40.80 (12.10)	43.59 (11.68)	$F(3.61) = 0.382$	n.s.				
Education (years)	14.88 (0.99)	14.94 (1.53)	14.94 (0.85)	15.25 (0.58)	$F(3.61) = 0.415$	n.s.				
Clinical measures†										
DES (T)	54.41 (16.18)	4.92 (2.45)	22.18 (13.83)	5.49 (3.46)	H(3) = 47.61	$P < 0.001$**	U = 0. $Z = 4.90$. $P < 0.001$^^	U = 18. $Z = 4.25$. $P < 0.001$^^	U = 0. $Z = 4.90$. $P < 0.001$^^	U = 23.5. $Z = 3.94$. $P < 0.001$^^
SDQ-20 (T)	57.06 (17.26)	21.94 (2.08)	32.69 (13.43)	21.94 (2.35)	H(3) = 42.65	$P < 0.001$**	U = 0. $Z = 4.92$. $P < 0.001$^^	U = 32. $Z = 3.75$. $P < 0.001$^^	U = 0. $Z = 4.94$. $P < 0.001$^^	U = 38. $Z = 3.45$. $P < 0.001$^^
STAI-T (T)	52.71 (11.08)	36.20 (11.67)	55.88 (9.50)	34.81 (6.01)	H(3) = 32.25	$P < 0.001$**	U = 38.5. $Z = 3.36$. $P < 0.001$^^	n.s.	U = 20. $Z = 4.18$. $P < 0.001$^^	U = 11.5. $Z = 4.40$. $P < 0.001$^^
CDS (T)	134.76 (33.46)	17.40 (13.81)	64.56 (32.70)	18.13 (14.64)	H(3) = 47.36	$P < 0.001$**	U = 0. $Z = 4.82$. $P < 0.001$^^	U = 14. $Z = 4.40$. $P < 0.001$^^	U = 0. $Z = 4.90$. $P < 0.001$^^	U = 20. $Z = 4.07$. $P < 0.001$^^
Frequency	1.91 (0.51)	0.21 (0.18)	0.85 (0.44)	0.24 (0.17)	H(3) = 48.49	$P < 0.001$**	U = 0. $Z = 4.82$. $P < 0.001$^^	U = 14. $Z = 4.40$. $P < 0.001$^^	U = 0. $Z = 4.90$. $P < 0.001$^^	U = 15.5. $Z = 4.24$. $P < 0.001$^^
Duration	2.73 (0.70)	0.39 (0.37)	1.37 (0.72)	0.39 (0.36)	H(3) = 44.95	$P < 0.001$**	U = 5.00. $Z = 4.82$. $P < 0.001$^^	U = 21.5. $Z = 4.13$. $P < 0.001$^^	U = 0. $Z = 4.90$. $P < 0.001$^^	U = 25.5. $Z = 3.87$. $P < 0.001$^^
TEC total (T)	16.75 (3.32)	2.27 (2.40)	11.06 (4.01)	2.00 (1.93)	H(3) = 48.80	$P < 0.001$**	U = 0. $Z = 4.77$. $P < 0.001$^^	U = 25. $Z = 3.90$. $P < 0.001$^^	U = 0. $Z = 4.85$. $P < 0.001$^^	U = 5.00. $Z = 4.66$. $P < 0.001$^^
Emotional Neglect	13.00 (0.00)	1.20 (3.19)	7.50 (5.82)	2.19 (3.97)	H(3) = 40.72	$P < 0.001$**	U = 0. $Z = 5.34$. $P < 0.001$^^	U = 56. $Z = 3.43$. $P = 0.006$^^	U = 0. $Z = 5.32$. $P < 0.001$^^	U = 61. $Z = 2.76$. $P = 0.011$^^
Emotional Abuse	11.75 (3.07)	0.93 (2.49)	6.81 (5.36)	0.25 (1.00)	H(3) = 43.48	$P < 0.001$**	U = 3. $Z = 5.01$. $P < 0.001$^^	U = 58.50. $Z = 2.89$. $P = 0.007$^^	U = 0. $Z = 5.25$. $P < 0.001$^^	U = 36. $Z = 3.91$. $P < 0.001$^^
Physical Abuse	11.44 (3.74)	0.67 (2.58)	3.68 (4.19)	0.25 (1.00)	H(3) = 41.69	$P < 0.001$**	U = 10. $Z = 4.82$. $P < 0.001$^^	U = 26. $Z = 4.04$. $P < 0.001$^^	U = 0. $Z = 5.01$. $P < 0.001$^^	U = 55.5. $Z = 3.23$. $P = 0.005$^^
Sexual Harassment	9.31 (4.98)	0.80 (1.61)	2.56 (2.58)	0.06 (0.25)	H(3) = 34.62	$P < 0.001$**	U = 22. $Z = 4.04$. $P < 0.001$^^	U = 38. $Z = 3.46$. $P < 0.001$^^	U = 17. $Z = 4.60$. $P < 0.001$^^	U = 42.5. $Z = 3.72$. $P = 0.001$^^
Sexual Abuse	9.75 (4.71)	0.13 (0.52)	2.38 (3.07)	0.00 (0.00)	H(3) = 43.27	$P < 0.001$**	U = 8. $Z = 4.79$. $P < 0.001$^^	U = 28. $Z = 3.86$. $P < 0.001$^^	U = 8. $Z = 4.99$. $P < 0.001$^^	U = 56. $Z = 3.42$. $P = 0.006$^^
PBI (T)										
Mother care	19.06 (5.45)	37.56 (8.50)	26.94 (11.17)	32.94 (8.80)	H(3) = 25.29	$P < 0.001$**	U = 255. $Z = 4.29$. $P < 0.001$^^	n.s.	U = 250. $Z = 4.11$ $P < 0.001$^^	n.s.
Mother protection	37.88 (9.03)	24.13 (5.50)	28.31 (7.82)	27.56 (8.18)	H(3) = 18.14	$P = 0.001$**	U = 33. $Z = 3.72$. $P < 0.001$^^	U = 60. $Z = 2.74$. $P = 0.005$^^	U = 51. $Z = 3.07$. $P = 0.002$^^	n.s.
Father care	19.53 (6.98)	33.88 (6.01)	32.13 (10.94)	31.50 (9.18)	H(3) = 20.22	$P < 0.001$**	U = 253.5. $Z = 4.24$. $P < 0.001$^^	U = 221. $Z = 3.07$. $P = 0.002$^^	U = 230.5. $Z = 3.41$. $P < 0.001$^^	n.s.
Father protection	38.24 (8.11)	24.31 (6.24)	26.44 (7.78)	27.00 (5.54)	H(3) = 21.86	$P < 0.001$**	U = 28.5. $Z = 3.88$. $P < 0.001$^^	U = 42.5. $Z = 3.38$. $P < 0.001$^^	U = 32. $Z = 3.75$. $P < 0.001$^^	n.s.
ISES (F)										
General sleep	57.88 (16.83)	38.07 (11.91)	50.81 (14.81)	28.63 (10.22)	H(3) = 27.80	$P < 0.001$**	U = 33. $Z = 3.57$. $P < 0.001$^^	n.s.	U = 21.5. $Z = 4.13$. $P < 0.001$^^	U = 27.5. $Z = 3.79$. $P < 0.001$^^
Lucid dreams	7.06 (4.07)	6.53 (2.95)	6.56 (4.34)	4.63 (2.80)	H(3) = 6.01	n.s.				
CEQ (F)	9.71 (5.93)	6.93 (4.18)	7.81 (3.51)	3.81 (3.12)	H(3) = 11.54	$P = 0.009$*	n.s.	n.s.	U = 57.50. $Z = 2.84$. $P = 0.004$^^	U = 56.5. $Z = 2.72$. $P = 0.006$^^
SIMS total (F)	23.59 (7.01)	6.53 (4.75)	14.94 (6.18)	8.00 (6.18)	H(3) = 34.92	$P < 0.001$**	U = 8.00. $Z = 4.52$. $P < 0.001$^^	U = 48.5. $Z = 3.16$. $P = 0.001$^^	U = 20. $Z = 4.18$. $P < 0.001$^^	U = 46. $Z = 3.10$. $P = 0.001$^^

Table 2. (Continued)

					ANOVA/Kruskal–Wallis		Post hoc *P*-values			
	DID-G ($n = 17$)	DID-S ($n = 16$)	PTSD ($n = 16$)	HC ($n = 16$)	Statistic	*P*-value	DID-G vs. DID-S	DID-G vs. PTSD	DID-G vs. HC	PTSD vs. HC
Neurologic	5.41 (2.94)	0.67 (0.82)	2.06 (1.95)	1.06 (1.65)	H(3) = 29.20	$P < 0.001$**	U = 125. $Z = 4.41$. $P < 0.001$^^	U = 41. $Z = 3.45$. $P < 0.001$^^	U = 21.5. $Z = 4.22$. $P < 0.001$^^	n.s.
Affective	6.41 (2.29)	3.00 (1.85)	6.19 (2.04)	3.31 (1.96)	H(3) = 25.58	$P < 0.001$**	U = 28. $Z = 3.79$. $P < 0.001$^^	n.s.	U = 43.5. $Z = 3.37$. $P < 0.001$^^	U = 42. $Z = 3.28$. $P = 0.001$^^
Psychosis	3.35 (2.00)	0.47 (0.64)	0.88 (1.26)	0.31 (0.60)	H(3) = 26.35	$P < 0.001$**	U = 26. $Z = 3.94$. $P < 0.001$^^	U = 42.50. $Z = 3.45$. $P < 0.001$^^	U = 24. $Z = 4.21$. $P < 0.001$^^	n.s.
Low intelligence	2.53 (2.76)	1.53 (2.23)	2.94 (2.59)	2.06 (2.38)	H(3) = 4.28	n.s.				
Amnesia	5.88 (3.77)	0.87 (1.50)	2.88 (2.39)	1.25 (1.34)	H(3) = 25.30	$P < 0.001$**	U = 25.5. $Z = 3.95$. $P < 0.001$^^	U = 68.50. $Z = 2.45$. $P = 0.014$^	U = 30. $Z = 3.87$. $P < 0.001$^^	n.s.

DID-G, dissociative identity disorder-diagnosed genuine patients; DID-S, dissociative identity disorder-simulating controls (as non-simulating selves); PTSD, Posttraumatic Stress Disorder; HC, healthy controls; DES, Dissociative Experiences Scale; SDQ-20, Somatoform Dissociation Questionnaire; STAI-T, State-Trait Anxiety Inventory-Trait; CDS, Cambridge Depersonalization Scale; TEC, Traumatic Experiences Checklist; PBI, Parental Bonding Instrument; CEQ, Creative Experiences Questionnaire; SIMS, Structured Inventory of Malingering Symptoms; T, Trauma measure; F, Fantasy measure; n.s., not significant.
†TEC data were missing for 1 DID-G and 1 DID-S; STAI-T, PBI, CDS, CEQ, ISES, and SIMS data were missing for 1 DID-S.
**P-value ≤ 0.0056.
*P-value < 0.01 (a trend).
^^P-value ≤ 0.0125.
^P-value < 0.05 (a trend).

Fantasy model. Do dissociative personality states in DID differ on fantasy symptom measures compared with simulated DID and controls?. For the suggestibility measure [Gudjonsson Suggestibility Scale (GSS)], significant main effects were found for the Recall scores and an interaction effect was found for Recall part 2 ($P < 0.01$). Post hoc tests showed that the DID-S and control groups scored significantly higher on Recall compared with the DID-G group ($P < 0.01$) in both dissociative personality states. On Yield 1 and 2, Shift and Total Suggestibility, no significant effects were found. Individuals with DID-G were not more suggestible than individuals with PTSD, simulators, or HC. In all groups, NPS performed better compared with TPS, with the exception that for Recall 2 in the Control group TPS (i.e. PTSD) scored better than NPS (i.e. HC), as was reflected in a group × personality state interaction effect.

For the measure of false memories [Deese–Roediger–McDermott (DRM)], no significant main or interaction effects were found with the exception of a main effect of group on correct Recall ($P < 0.001$). Post hoc tests revealed that the DID-G group did not produce more false memories than the DID-S, PTSD, or HC groups. Individuals with DID-G showed significantly fewer correct responses compared with the DID-S group ($P < 0.001$), but did not differ from the control group with HC and PTSD.

Other. Do dissociative personality states in DID differ from simulated personality states and/or controls on the other 2 measures of interest?. Regarding personality characteristics measures [in Dutch Vragenlijst Kenmerken Persoonlijkheid (VKP)] a main effect of dissociative personality state ($P < 0.005$) was found for the subscales Paranoid, Schizoid, Schizotypical, Narcissistic, Avoidant, Dependent, Obsessive-Compulsive, Passive-Aggressive, Depressive and Borderline. Trauma states exhibited higher, more pathological scores than neutral states. No significant main effect of dissociative personality state was present for the subscales Antisocial and Theatrical. A significant main effect of group ($P < 0.005$) was found for all subscales except Paranoid. Post hoc tests showed that the DID-G and DID-S group differed on subscales Dependent and Borderline ($P < 0.025$) and a trend was found for subscales Avoidant and Depressive, all with generally higher scores for individuals with DID-G. Significant differences were found for the DID-G group when compared with controls on all subscales, with higher scores for individuals with DID-G ($P < 0.05$).

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Table 3. Results of repeated measures of part 2

Measures	DID-G-NPS (n = 14)	DID-G-TPS (n = 14)	DID-S-NPS (n = 16)	DID-S-TPS (n = 16)	PTSD (n = 16)	HC (n = 16)	Repeated measures		Post hoc P-values	
							Statistic	P-value	DID-G vs. DID-S	DID-G vs. Controls
BDI (T)	10.14 (9.25)	34.79 (12.42)	4.44 (7.29)	22.19 (11.57)	20.44 (12.20)	2.13 (2.92)	PS $F(1, 43) = 74.41$	$P < 0.001$**	$P < 0.001$^^	$P < 0.001$^^
							Group $F(2, 43) = 15.63$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 0.85$	n.s.		
CTQ (T)	86.43 (19.13)	97.14 (17.26)	40.38 (16.60)	78.94 (15.41)	60.94 (22.70)	35.94 (8.22)	PS $F(1, 43) = 65.22$	$P < 0.001$**	$P < 0.001$^^	$P < 0.001$^^
							Group $F(2, 43) = 40.47$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 6.73$	$P = 0.003$**		
REmotional Abuse	19.29 (4.71)	22.71 (3.41)	9.19 (4.53)	18.56 (4.80)	14.44 (6.31)	7.44 (2.50)	PS $F(1, 43) = 59.00$	$P < 0.001$**	$P < 0.001$^^	$P < 0.001$^^
							Group $F(2, 43) = 32.03$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 3.93$	n.s.		
Emotional Neglect	21.43 (2.90)	23.43 (2.34)	11.25 (5.53)	19.50 (3.44)	16.63 (6.02)	10.44 (4.27)	PS $F(1, 43) = 43,13$	$P < 0.001$**	$P < 0.001$^^	$P < 0.001$^^
							Group $F(2, 43) = 29,28$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 4,69$	n.s.		
Physical Abuse	13.71 (6.40)	15.50 (5.56)	5.81 (2.51)	12.50 (6.75)	9.31 (4.84)	5.38 (1.26)	PS $F(1, 43) = 23.67$	$P < 0.001$**	$P = 0.001$^^	$P < 0.001$^^
							Group $F(2, 43) = 13.13$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 2.74$	n.s.		
Physical Neglect	16.00 (4.17)	17.43 (4.01)	7.50 (2.97)	13.31 (4.19)	10.50 (3.93)	7.44 (2.31)	PS $F(1, 43) = 44.28$	$P < 0.001$**	$P < 0.001$^^	$P < 0.001$^^
							Group $F(2, 43) = 24.29$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 6.09$	$P = 0.005$**		
Sexual Abuse	16.00 (7.78)	18.07 (7.55)	6.63 (4.03)	15.06 (7.03)	10.06 (6.06)	5.25 (0.68)	PS $F(1, 43) = 22.69$	$P < 0.001$**	$P = 0.001$^^	$P < 0.001$^^
							Group $F(2, 43) = 14.91$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 2.19$	n.s.		
GSS† (F)										
Recall correct 1	15.14 (5.91)	8.71 (5.53)	19.56 (6.44)	15.09 (6.28)	16.69 (5.68)	20.87 (5.11)	PS $F(1, 43) = 22.49$	$P < 0.001$**	$P = 0.003$^^	$P < 0.001$^^
							Group $F(2, 43) = 9.13$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 0.40$	n.s.		
Recall correct 2	14.00 (5.78)	7.00 (5.32)	18.84 (6.76)	12.38 (5.78)	19.06 (5.45)	15.19 (5.11)	PS $F(1, 42) = 11.27$	$P = 0.002$**	$P = 0.006$^^	$P < 0.001$^^
							Group $F(2, 42) = 9.13$	$P = 0.002$**		
							PSxGroup $F(2, 42) = 14.30$	$P < 0.001$**		
Yield 1	4.23 (2.52)	2.69 (3.59)	4.31 (2.55)	4.63 (2.85)	4.06 (2.95)	4.31 (2.96)	PS $F(1, 42) = 0.84$	n.s.		
							Group $F(2, 42) = 0.72$	n.s.		
							PSxGroup $F(2, 42) = 0.98$	n.s.		
Yield 2	5.84 (3.05)	3.54 (3.99)	5.31 (3.53)	7.06 (4.30)	4.62 (3.83)	6.75 (4.12)	PS $F(1, 42) = 1.71$	n.s.		
							Group $F(2, 42) = 0.85$	n.s.		
							PSxGroup $F(2, 42) = 3.87$	n.s.		
Shift	2.54 (2.18)	1.85 (2.15)	3.44 (2.73)	4.00 (2.90)	3.50 (3.67)	3.69 (2.98)	PS $F(1, 42) = 0.03$	n.s.		
							Group $F(2, 42) = 2.17$	n.s.		
							PSxGroup $F(2, 42) = 0.41$	n.s.		
Total suggestibility	6.77 (3.11)	4.54 (4.54)	7.75 (4.64)	8.63 (4.60)	7.56 (5.68)	8.00 (4.86)	PS $F(1, 42) = 0.51$	n.s.		
							Group $F(2, 42) = 1.82$	n.s.		
							PSxGroup $F(2, 42) = 1.11$	n.s.		

Table 3. (Continued)

Measures	DID-G-NPS (n = 14)	DID-G-TPS (n = 14)	DID-S-NPS (n = 16)	DID-S-TPS (n = 16)	PTSD (n = 16)	HC (n = 16)	Repeated measures		Post hoc P-values	
							Statistic	P-value	DID-G vs. DID-S	DID-G vs. Controls
DRM‡ (F)										
Recall										
Recall correct	7.46 (1.66)	6.37 (1.52)	8.99 (1.72)	8.62 (1.81)	7.08 (1.78)	7.64 (1.00)	PS $F(1, 42) = 6.34$	n.s.	$P < 0.001$^^	n.s.
							Group $F(2, 42) = 8.24$	$P = 0.001$**		
							PSxGroup $F(2, 42) = 0.61$	n.s.		
Critical lure	0.58 (0.19)	0.40 (0.26)	0.53 (0.29)	0.43 (0.23)	0.53 (0.23)	0.59 (0.20)	PS $F(1, 42) = 7.09$	n.s.		
							Group $F(2, 42) = 0.84$	n.s.		
							PSxGroup $F(2, 42) = 0.60$	n.s.		
Commission	0.19 (0.18)	0.19 (0.18)	0.23 (0.35)	0.15 (0.32)	0.13 (0.17)	0.10 (0.14)	PS $F(1, 42) = 0.26$	n.s.		
							Group $F(2, 42) = 0.70$	n.s.		
							PSxGroup $F(2, 42) = 0.66$	n.s.		
Recognition										
Recognition critical lure (%)	0.76 (0.18)	0.73 (0.20)	0.73 (0.14)	0.71 (0.12)	0.80 (0.15)	0.74 (0.20)	PS $F(1, 39) = 0.068$	n.s.		
							Group $F(2, 39) = 0.48$	n.s.		
							PSxGroup $F(2, 39) = 0.95$	n.s.		
Confidence recognition CL	3.69 (0.41)	3.60 (0.30)	3.58 (0.37)	3.41 (0.52)	3.48 (0.60)	3.69 (0.27)	PS $F(1, 39) = 3.23$	n.s.		
							Group $F(2, 39) = 0.71$	n.s.		
							PSxGroup $F(2, 39) = 0.16$	n.s.		
Recognition old words	0.68 (0.14)	0.64 (0.14)	0.69 (0.07)	0.71 (0.08)	0.69 (0.12)	0.65 (0.11)	PS $F(1, 39) = 0.11$	n.s.		
							Group $F(2, 39) = 0.98$	n.s.		
							PSxGroup $F(2, 39) = 0.87$	n.s.		
Confidence recognition OW	3.62 (0.32)	3.41 (0.46)	3.53 (0.25)	3.47 (0.37)	3.35 (0.52)	3.57 (0.33)	PS $F(1, 39) = 4.02$	n.s.		
							Group $F(2, 39) = 0.164$	n.s.		
							PSxGroup $F(2, 39) = 0.42$	n.s.		
Recognition new words	0.90 (0.08)	0.89 (0.10)	0.89 (0.07)	0.88 (0.11)	0.85 (0.14)	0.87 (0.10)	PS $F(1, 39) = 0.66$	n.s.		
							Group $F(2, 39) = 0.83$	n.s.		
							PSxGroup $F(2, 39) = 0.026$	n.s.		
Confidence recognition NW	3.29 (0.66)	3.22 (0.81)	3.21 (0.54)	3.14 (0.51)	2.57 (0.74)	3.15 (0.54)	PS $F(1, 39) = 4.59$	n.s.		
							Group $F(2, 39) = 2.18$	n.s.		
							PSxGroup $F(2, 39) = 2.44$	n.s.		
VKP (O)										
Paranoid	6.43 (3.84)	7.71 (2.59)	3.56 (4.26)	8.88 (3.42)	6.88 (3.76)	1.75 (1.88)	PS (1, 43) = 32.42	$P < 0.001$**	n.s.	$P = 0.004$^^
							Group $F(2, 43) = 4.97$	n.s.		
							PSxGroup $F(2, 43) = 3.50$	n.s.		
Schizoid	5.29 (3.93)	9.43 (2.98)	3.56 (4.03)	8.56 (3.56)	3.00 (2.71)	1.44 (2.80)	PS (1, 43) = 22.94	$P < 0.001$**	n.s.	$P < 0.001$^^
							Group $F(2, 43) = 21.73$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 2.00$	n.s.		
Schizotypical	5.14 (4.15)	10.36 (3.54)	4.13 (3.50)	9.00 (3.60)	4.50 (3.90)	0.13 (0.50)	PS (1, 43) = 50.90	$P < 0.001$**	n.s.	$P < 0.001$^^
							Group $F(2, 43) = 19.78$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 0.13$	n.s.		
Antisocial	7.36 (6.59)	8.21 (7.91)	6.31 (11.26)	11.87 (10.92)	2.69 (2.50)	0.31 (0.70)	PS (1, 43) = 3.01	n.s.	n.s.	$P = 0.002$^^
							Group $F(2, 43) = 9.53$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 0.67$	n.s.		
Theatrical	3.50 (3.23)	4.57 (1.91)	3.31 (3.38)	4.75 (3.59)	2.44 (2.34)	0.56 (0.96)	PS (1, 43) = 6.53	n.s.	n.s.	$P = 0.001$^^
							Group $F(2, 43) = 8.97$	$P = 0.001$**		
							PSxGroup $F(2, 43) = 0.16$	n.s.		

Table 3. (Continued)

Measures	DID-G-NPS (n = 14)	DID-G-TPS (n = 14)	DID-S-NPS (n = 16)	DID-S-TPS (n = 16)	PTSD (n = 16)	HC (n = 16)	Repeated measures		Post hoc P-values	
							Statistic	P-value	DID-G vs. DID-S	DID-G vs. Controls
Narcissistic	3.43 (4.99)	4.29 (3.10)	3.06 (3.34)	7.31 (4.81)	2.13 (2.28)	0.56 (1.37)	PS (1, 43) = 9.99	$P = 0.003$**	n.s.	$P = 0.011$^^
							Group $F(2, 43) = 9.00$	$P = 0.001$**		
							PSxGroup $F(2, 43) = 2.18$	n.s.		
Avoidant	4.93 (4.27)	9.93 (3.50)	4.19 (4.23)	6.88 (5.76)	6.06 (4.89)	1.00 (1.10)	PS (1, 43) = 17.81	$P < 0.001$**	$P = 0.045$^	$P < 0.001$^^
							Group $F(2, 43) = 9.06$	$P = 0.001$**		
							PSxGroup $F(2, 43) = 0.62$	n.s.		
Dependent	4.43 (3.72)	9.36 (2.13)	4.81 (4.28)	5.38 (5.76)	5.37 (4.37)	1.38 (1.71)	PS (1, 43) = 10.17	$P = 0.003$**	$P = 0.022$^^	$P < 0.001$^^
							Group $F(2, 43) = 10.72$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 1.81$	n.s.		
Obsessive-Compulsive	5.00 (3.60)	5.79 (1.72)	4.50 (2.68)	6.44 (3.52)	4.81 (3.25)	1.56 (2.10)	PS (1, 43) = 10.34	$P = 0.002$**	n.s.	$P = 0.004$^^
							Group $F(2, 43) = 6.54$	$P = 0.003$**		
							PSxGroup $F(2, 43) = 1.30$	n.s.		
Passive-Aggressive	2.57 (2.44)	5.00 (2.54)	2.44 (3.48)	6.56 (3.61)	2.06 (2.21)	0.56 (1.03)	PS (1, 43) = 22.21	$P < 0.001$**	n.s.	$P < 0.001$^^
							Group $F(2, 43) = 12.38$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 1.90$	n.s.		
Depressive	3.93 (2.84)	9.00 (2.99)	2.69 (3.14)	6.75 (5.09)	6.12 (4.10)	0.94 (1.57)	PS (1, 43) = 34.01	$P < 0.001$**	$P = 0.03$^	$P < 0.001$^^
							Group $F(2, 43) = 7.20$	$P = 0.002$**		
							PSxGroup $F(2, 43) = 0.20$	n.s.		
Borderline	7.29 (4.16)	10.50 (2.88)	4.81 (3.43)	8.69 (3.28)	6.75 (4.12)	0.88 (0.96)	PS $F(1, 43) = 32.00$	$P < 0.001$**	$P = 0.007$^^	$P < 0.001$^^
							Group $F(2, 43) = 23.16$	$P < 0.001$**		
							PSxGroup $F(2, 43) = 1.10$	n.s.		
PANSS§ (O)										
Total	44.70 (11.94)	64.40 (21.87)	36.44 (5.37)	52.69 (17.45)	40.17 (7.35)	30.58 (0.90)	PS $F(1, 35) = 44.24$	$P < 0.001$**	$P = 0.025$^^	$P < 0.001$^^
							Group $F(2, 35) = 8.94$	$P = 0.001$**		
							PSxGroup $F(2, 35) = 1.57$	n.s.		
Positive	11.90 (3.70)	15.50 (4.45)	8.75 (2.67)	11.63 (4.73)	8.79 (2.46)	7.21 (0.43)	PS $F(1, 35) = 14.37$	$P = 0.001$**	$P = 0.002$^^	$P < 0.001$^^
							Group $F(2, 35) = 12.71$	$P < 0.001$**		
							PSxGroup $F(2, 35) = 0.51$	n.s.		
Negative	10.30 (6.78)	16.50 (7.09)	8.00 (1.55)	14.44 (5.35)	8.86 (1.35)	7.07 (0.27)	PS $F(1, 35) = 34.12$	$P < 0.001$**	n.s.	$P = 0.001$^^
							Group $F(2, 35) = 6.56$	$P = 0.004$**		
							PSxGroup $F(2, 35) = 3.52$	n.s.		
Global	23.50 (5.50)	32.40 (11.72)	19.69 (3.05)	27.81 (8.40)	22.21 (4.39)	16.36 (0.84)	PS $F(1, 35) = 40.58$	$P < 0.001$**	n.s.	$P = 0.001$^^
							Group $F(2, 35) = 6.85$	$P = 0.003$**		
							PSxGroup $F(2, 35) = 0.45$	n.s.		

DID-G-NPS, dissociative identity disorder-diagnosed genuine patients—neutral personality state; DID-G-TPS, dissociative identity disorder-diagnosed genuine patients—trauma-related personality state; DID-S-NPS, dissociative identity disorder - simulating controls—neutral personality state; DID-S-NPS, dissociative identity disorder-simulating controls—trauma-related personality state; PTSD, post-traumatic stress disorder; HC, healthy controls; Controls, HC and PTSD; BDI, Beck Depression Inventory; CTQ, Childhood Trauma Questionnaire; GSS, Gudjonsson Suggestibility Scale; DRM, Deese–Roediger–McDermott; VKP, Vragenlijst voor Kenmerken van de Persoonlijkheid (Questionnaire on Personality Traits); PANSS, Positive and Negative Symptom Scale; T, Trauma measure; F, Fantasy measure; O, Other measure; n.s., not significant.

**P-value $\leq$ 0.0083.

^^P-value $\leq$ 0.025.

^P-value $<$ 0.05 (a trend).

†GSS: Recognition 2, Yield 1 and 2, Shift, and Total suggestibility were missing for 1 DID-G.

‡DRM recall data were missing for 1 DID-G and DRM recognition for 2 DID-G, 1 DID-S, and 1 HC.

§PANSS data were missing for 4 DID-G and 4 HC.

Syndrome Scale (PANSS)], main effects of dissociative personality state and group were found for total PANSS score as well as for all subscales, that is, positive, negative, and global ($P < 0.005$). For PANSS total and the positive subscale, the DID-G group showed significantly higher scores in post hoc testing compared with the DID-S and control groups ($P < 0.025$). Regarding the subscales negative and global, individuals with DID-G scored significantly higher compared with controls ($P \leq 0.001$), but not as compared with the DID-S group. On all scales, for all groups, the trauma states showed significantly higher scores compared with neutral states ($P \leq 0.001$).

Discussion

The purpose of the current study was to test two etiological models of DID: the Trauma Model vs. the Fantasy Model. To this end, a wide range of psychological measures were obtained from individuals with diagnosed genuine dissociative identity disorder (DID-G), DID-simulating healthy controls (DID-S), individuals with post-traumatic stress disorder (PTSD), and study-blind healthy controls (HC). All subjects participated in two parts of the study. In Part 1, group comparisons were made between the four groups with DID-G and DID-S participating as their normal self, whereas in Part 2 DID-G and DID-S participated in two dissociative personality states, with DID-S simulating the trauma-related personality state (TPS) and neutral personality state (NPS). Our study provides new psychological data supporting the Trauma Model and contradicting the Fantasy Model.

For the fantasy measures, inconsistent results were found. Both individuals with DID-G and PTSD reported higher levels of fantasy and daydreaming when compared with HC, while no differences were found comparing the neutral personality state of the DID-G group to the normal self of the DID-S group, or to individuals with PTSD. This indicates that both individuals with DID-G and PTSD were similar in fantasy proneness and did not differ from healthy actresses. This finding contradicts the Fantasy Model's hypotheses. Results are in line with a recent study by Van Heugten-van der Kloet et al. (69), which reported differences in fantasy and daydreaming between DID and HC, and PTSD and HC respectively, but that study also did not find differences between DID and PTSD.

On the other hand, the DID-G group scored higher on the SIMS questionnaire, which was included to test malingering, as compared with the other groups. Malingering of psychiatric symptoms fits the Fantasy Model. The SIMS includes subscales assessing amnesia as well as affective, psychotic, and neurological symptoms. Although affective, psychotic and neurological symptoms may be rare in some patient groups, they are well documented as common symptoms among individuals with DID (7, 8, 27). For example, individuals with DID have many intrusion symptoms that Schneider would have described as classic symptoms of schizophrenia and several studies have documented that the first-rank symptoms for schizophrenia are as common in DID (70–72). Furthermore, even though the SIMS shows good test–retest reliability and internal consistency, it can be argued that the SIMS examines a wide range of symptoms that co-occur with pathological dissociative symptoms. Indeed, dissociative amnesia is a required diagnostic symptom of DID (1). It is even pathognomic for the disorder. Therefore, it can be argued that the elevated scores on this scale in the DID-G group in comparison with the other groups provides validation for their diagnosis, which can in fact be interpreted as support for the Trauma Model. With these paradoxical interpretations of the malingering data, we propose that future studies include larger samples of DID and PTSD to determine whether this measure is valid for highly traumatized samples, or include different tests for malingering in DID to confirm or challenge our findings.

With regard to sleep- and dream-related experiences, both individuals with DID-G and PTSD reported higher levels of sleep disturbances, which fits the Fantasy Model. This model posits that sleep disturbances may be a mediating factor in dissociative pathology. While this could be the case, sleep disturbances can also be related to the nightmares, hyperarousal, and sleep avoidance that is well documented among traumatized individuals including those with DID and PTSD (56, 73, 74). Thus, this result may in fact not be supportive for a Fantasy Model, but more so for a Trauma Model. Results are comparable to the only other study on sleep in individuals with DID, which found that both individuals with DID and PTSD (69) showed more unusual sleep experiences than controls and a higher level of unusual sleep experiences predicted participants belonging to the DID group. Unusual sleep phenomena that are difficult to control, including nightmares and waking dreams, are related to dissociative symptoms (56, 75). However, the more controllable, lucid dreams are only weakly related to dissociative symptoms (56). This is in line with our study's finding that the groups did not differ on lucid dreams supporting the Trauma Model.

When we examined dissociative-personality-state-dependent differences, significant effects were found only for the recall tests of the fantasy measures (GSS and DRM) with a general better performance in the DID-S and control groups. Thus, individuals with DID-G showed more difficulty with memory than either the simulators or controls, which is consistent with the Trauma Model. Interestingly, no group differences were found on measures of suggestibility or false memory creation. This contradicts the Fantasy Model's primary thesis that individuals with DID are highly suggestible and overly vulnerable to sociocultural influences, and consequently develop their symptoms of dissociation and their alleged false recollections of having been abused in childhood. Our findings that individuals with DID-G are not more suggestible than individuals with PTSD or other controls and that they did not generate more false memories challenges the core of the Fantasy Model. Researchers have found that dissociation is associated with increased commission memory errors (i.e. false positives) but not omission memory errors (i.e. false negatives) (11, 76). The latter are presumably associated with dissociative amnesia. Studies have shown a rather consistent small-to-moderate link between dissociation (generally measured with DES) and commission errors across a variety of paradigms, but studies using the DRM paradigm tend to be an exception (10). The lack of commission errors in DRM studies is consistent with our lack of commission findings (77). Indeed, we did not find group differences on commission errors yet differences in recall were present. Poor recall within the DID group is more consistent with the Trauma Model given that amnesia is a core diagnostic criteria for DID related to exposure to early trauma.

For trauma measures, results from both between-group and dissociative-personality-state-dependent symptom lists are consistent with the Trauma Model's predictions. As expected, on all these measures the DID-G group showed higher scores than the PTSD group, and the PTSD group showed higher scores than the DID-S group as their normal self, and than the HC group. Hence, we found a continuum across the groups that is consistent with the idea that more severe and chronic trauma exposure, particularly in childhood, is associated with elevated dissociative symptoms (78) and is supportive of a continuum of trauma-related disorders (78–80). When examining dissociative-personality-state differences a similar pattern emerged for depressive symptoms. Higher scores for depression in the DID-G group compared with the DID-S, PTSD or HC groups support the Trauma Model.

In addition to results obtained from symptom measures that support the Trauma Model, the results on childhood trauma history support the Trauma Model as well. Both childhood trauma and emotional neglect were retrospectively assessed and could thus be distorted by the patients' amnesia as well as the general fallibility of memory for all of us. It is possible that any of the groups' recollections of childhood trauma were under- or overestimates of these experiences. This caveat applies to all retrospective studies that include reports of childhood trauma [see, for example, (81)]. On our measures of emotional neglect and attachment, the DID-G group showed higher scores than the PTSD group for maternal and paternal overprotection, whereas the PTSD group reported higher scores for paternal care. Overprotection has been associated with disorganized attachment, which is common in DID (82), and is consistent with ideas from the Trauma Model. Furthermore, psychoform and somatoform dissociation has been related to neglect as well as childhood trauma (21, 82). The DID-G and PTSD groups scored similarly high for lack of maternal affection. This similarity of DID and PTSD supports the Trauma Model. When examining dissociative-personality-state differences in individuals with DID-G we found more severe trauma reports in TPS compared with NPS and the DID-G group scored higher on trauma measures compared with all other groups. As the TPS of the DID-G group is more consciously aware of their traumatic experiences (78), it is important to investigate dissociative-personality-state-dependent retrospective reports of childhood trauma (17, 39). These findings are predicted by the Trauma Model and they are consistent with the clinical profile of DID (36).

With regard to the other measures, the higher scores in the DID-G group for the PANSS total and the positive syndrome subscale are in line with the notion that Schneiderian first-rank symptoms and voices conversing appear to be more common in DID than in schizophrenia (83). Past research has found that childhood trauma is positively associated with dissociation, hallucinations, and delusions (68, 83–85). Results are consistent with dissociative accounts of the trauma–hallucination link and are in line with the Trauma Model. In general, TPS scored higher across all PANSS scales than NPS, fitting the apparent normality of NPS. Considering the assessment of personality characteristics, it is the question whether the generally higher scores for the DID-G group could be

interpreted as supporting the Trauma Model as high comorbidity of personality disorders is common in individuals with DID (64, 86). TPS exhibited even higher scores than NPS, which is consistent with research showing that personality disorders are common in highly traumatized samples (87, 88), as severe interpersonal traumatization afflicts the capacity to trust others, the capacity for intimacy, as well as the identity organization itself.

Of note, finally, proponents of the Trauma Model acknowledge that some features of dissociative personality states can be influenced by sociocultural factors (36) and that there are psychiatric patients who imitate DID, often truly believing they have the disorder when in fact they do not (32). Even if DID symptoms can be simulated and reinforced iatrogenically (22) in some cases, this phenomenon evidently does not prove that genuine trauma-related DID does not exist (89).

Some strengths and limitations of the present study should be noted. A strength is that the DID diagnoses were established by one of two independent experts in the DID field, limiting the chance of including false positive cases (32). Another strength is that our study is the first to include matched groups in one comprehensive design to test the Trauma Model and Fantasy Model using validated self-report measures.

A limitation is our modest sample sizes. Only a limited number of participants could be included in each group as the current data were developed during a larger neuroimaging study that required control over dissociative-personality-state switches. However, our sample size of individuals with DID is not unusual in the literature due to the difficulties of recruiting patients who are often afraid of people and quite symptomatic. The lack of parallel data in the group comparisons and the dissociative-personality-state comparisons is another limitation. Apart from the SCID-D and CAPS we did not conduct other standardized interviews to assess presence of axis I disorders in our sample. Comorbidity in DID is generally high (90, 91); therefore, future studies need to use other comparison groups to determine whether these patterns of findings are due to other disorders or are specific to DID.

Only female DID participants and controls were studied. Studies focusing on a single gender can be seen as advantageous for eliminating gender differences as an explanatory variable. Furthermore, no major differences in the clinical phenomenology of female and male patients with DID were reported in previous studies (92, 93).

In conclusion, a clear pattern emerged in this study for a trauma-related etiology of DID. We found a continuum of trauma-related symptom severity across the various groups. This continuum supports the hypothesis that there is an association between the severity, intensity, as well as the age at onset of traumatization, and the severity of trauma-related psychopathology. On the other hand, the fact the women with genuine DID were not more suggestible and not more prone to generate false memories than the other groups challenges the Fantasy Model's core hypothesis. Overall, the present study provides considerable validation for DID as a trauma-related disorder. Apart from its contribution to the discussion on the etiology and nature of DID, the study's combined findings inform clinicians and forensic experts in need of empirical guidance regarding differences between simulated and genuine DID.

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Declaration of interest

None.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Definition of dissociation.
Appendix S2. Characteristics of DID-G and DID-S personality states.
Appendix S3. Simulation paradigm.
Appendix S4. Questionnaires.
Appendix S5. Overlap in trauma- and fantasy measures.
Table S1. Subjectively reported personality-state characteristics.
Table S2. Questionnaires per category.