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## Pieces of the Puzzle

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# CHAPTER 2



IS IT TRAUMA OR FANTASY-BASED?  
COMPARING DISSOCIATIVE IDENTITY DISORDER,  
POSTTRAUMATIC STRESS DISORDER,  
SIMULATORS, AND CONTROLS

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## ABSTRACT

**Background:** 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.

**Methods:** The present 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 posttraumatic 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.

**Results:** 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.

**Conclusion:** Evidence consistently supported the trauma model of DID and challenges the core hypothesis of the fantasy model.

## INTRODUCTION

The dissociative disorders (DD) are placed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association 2013) next to the trauma and stressor related disorders (TSRD) section to indicate links between these categories (Spiegel et al. 2011). This placement is based on the discovery of a dissociative subtype of posttraumatic stress disorder (PTSD) (Lanius et al. 2010, Lanius et al. 2012, Wolf et al. 2012b, Wolf et al. 2012a). 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 (Boon, Draijer 1993b, Putnam et al. 1986, Ross, Norton & Wozney 1989), DID is viewed as a controversial diagnosis by sceptics who debate its diagnostic validity and etiology (Giesbrecht et al. 2008, Lynn et al. 2012).

The *trauma model* (Dalenberg et al. 2012) posits that DID is a severe trauma-related disorder, typically with comorbid PTSD (Putnam et al. 1986), 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 (Dalenberg et al. 2012, Reinders 2008, Boysen, VanBergen 2013, Dorahy et al. 2014), but accumulated findings support a trauma model (Dalenberg et al. 2012) of dissociation and DID, which is sustained by recent neurobiological studies (Chalavi et al. 2014, Reinders et al. 2014, Chalavi et al. 2015, Schlumpf et al. 2013, Schlumpf et al. 2014).

In contrast, the *fantasy model* (Dalenberg et al. 2012), also referred to as the sociocognitive (Spanos 1994) or non-trauma-related model (Reinders et al. 2012), 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 (Brand et al. 2006, Reinders et al. 2012, Huntjens, Verschuere & McNally 2012, Schlumpf et al. 2013, Schlumpf et al. 2014, Brand et al. 2014, Brand, Chasson 2015). 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, identity confusion and absorption, yet simulators fail to adequately present the subtle and less well known symptoms and associated features of DID (Brand et al. 2006, Brand, Chasson 2015, Brand et al. 2014). For example, a measure of symptom over-reporting was best able to discriminate simulated DID (Brand, Chasson 2015). Thus far these studies have provided support for the validity of DID as a diagnosis that cannot be easily imitated on psychological testing.

Dalenberg et al. (2012) reviewed the evidence for both the trauma- 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 still is 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. leapt too quickly from correlational data to causal conclusions and that they did not adequately consider the lack of corroboration of abuse in many studies (Lynn et al. 2014). Despite the descriptive nature of literature reviews they are of pivotal importance for the trauma versus fantasy debate (Giesbrecht et al. 2008, Dalenberg et al. 2012) because empirical research testing the trauma versus fantasy model in one comprehensive design, for example comparing individuals with genuine DID to a matched trauma group, such as PTSD, on one hand and a DID simulating healthy control group on the other hand, is currently lacking. The current study therefore aims 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) with 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' trauma exposure with the assumed early and chronic form in DID-G, while including healthy DID simulating 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 versus 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](http://www.neuroimaging-DID.com) (Chalavi et al. 2012, Chalavi et al. 2014, Chalavi et al. 2015)) 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 fulfils tasks in daily life, hence as their apparently normal self. In DID, following the terminology of the DSM-5 (American Psychiatric Association 2013) and Reinders et al. (2006), and the conceptualization of Van der Hart et al. (2006), 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 to 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 versus PTSD, DID-S, and HC) will show that individuals with DID-G will score higher on trauma-related variables, including (somatoform) 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- and fantasy model with respect to DID-G's *dissociative-personality-state differences* the DID-S group participated in both a simulated NPS as well as 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 (that is 3 groups, 2 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 aims to compare psychological test data from two patient groups and two control groups to examine if the trauma or fantasy model fits the findings best. If the trauma model is correct, dissociative identity disorder patients should have higher scores for trauma-related measures (such as dissociative symptoms and reported adverse events) than patients with posttraumatic stress disorder, healthy controls, and individuals simulating dissociative identity disorder. If the fantasy model is correct, dissociative identity disorder patients should have higher scores for suggestibility and false memories.

## 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 posttraumatic 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 (Steinberg

1993) (SCID-D; Dutch translation (Boon, Draijer 1994)).

In consultation with their therapists, individuals with DID-G decided which neutral personality state (NPS) and trauma-related personality state (TPS) (Reinders et al. 2003) 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 (Reinders et al. 2003, Reinders et al. 2006, Reinders et al. 2012). Fourteen individuals with DID-G participated in both NPS and TPS; three individuals with DID-G 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 supplementary material S2.1 and for comorbidity and a description of the dissociative personality states see supplementary material S2.2 and Table S2.1.

### ***Control subjects***

Participants in the 3 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: the presence of dissociative symptoms, as determined with the Dissociative Experiences Scale (DES cut-off >25) (Bernstein, Putnam 1986) and Somatoform Dissociation Questionnaire (SDQ-20 cut-off >28; SDQ-5 cut-off >7) (Nijenhuis et al. 1996), a high score on the Traumatic Experience Checklist (TEC impact >2) (Nijenhuis, Van der Hart & Kruger 2002), high levels of general anxiety on the State-Trait Anxiety Inventory-Trait scale (STAI-T) (Spielberger et al. 1983), 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](http://www.theaternetwerk.nl), magazines and newspapers. All actors had at least 2 years experience with acting. After completing a 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 (Huntjens et al. 2006), which has been recognized as being rigorous (Boysen,

VanBergen 2014) (see supplementary material S2.3). The actors simulating DID were asked to enact two dissociative personality states consistent with an NPS and TPS as seen in individuals with DID (Van der Hart, Nijenhuis & Steele 2006, Reinders et al. 2012, Schlumpf et al. 2013, Schlumpf et al. 2014, Nijenhuis 2015). To prepare them for their participation, DID-S participants received written instructions, a documentary about DID (Mierendorf 1993), and the movie *Sybil* (Petrie 1976) 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 if the phenomena related to DID were fully understood. For a description of these states, see supplementary material S2.2 and Table S2.1 for an overview.

*PTSD* was diagnosed by the researchers E.V. and M.G. using the Clinician-Administered PTSD Scale (Blake et al. 1990, Blake et al. 1995) (CAPS; Dutch translation, KIP (Hovens, Luinge & Van Minnen 2005); mean CAPS score of 61.25 ( $\pm 14.07$ )). All included individuals with PTSD had experienced interpersonal trauma, which was required in order to represent a mild version of the interpersonal trauma common in DID.

*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 centres.

Part 1 of the study allowed us to test *group differences*. Online questionnaires were administered to individuals in the DID-G (as their apparently normal self, an NPS), DID-S, PTSD, and HC groups. Participants in the DID-S and HC groups responded truthfully as themselves in order 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 supplementary material S2.4 and Table S2.2. All instruments had good reliability and validity as is also described in supplementary material S2.4.

### ***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 (Bernstein, Putnam 1986) (DES), the severity of somatoform dissociation was measured with the Somatoform Dissociation Questionnaire (Nijenhuis et al. 1996) (SDQ-20), emotional aspects of anxiety targeted to the individual's general and longstanding anxiety level was assessed with the State-Trait Anxiety Inventory-Trait scale (Spielberger et al. 1983) (STAI-T), and the frequency and duration of depersonalization symptoms was measured with the Cambridge Depersonalization Scale (Bernstein, Fink 1998) (CDS). In Part 2 of the study the current level of depression was measured with the Beck Depression Inventory (Beck et al. 1961) (BDI).

*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 (Nijenhuis, Van der Hart & Kruger 2002) (TEC) and care and protection from father and mother were measured with the Parental Bonding Instrument (Parker, Tupling & Brown 1979) (PBI). In Part 2 of the study the frequency of maltreatment experiences during childhood was assessed using the Childhood Trauma Questionnaire (Bernstein et al. 1994, Bernstein, Fink 1998) (CTQ).

### ***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 (Watson 2001) (ISES), fantasy proneness was measured with the Creative Experiences Questionnaire (Merckelbach, Horselenberg & Muris 2001) (CEQ), and malingering of psychiatric symptoms and/or cognitive impairments were measured with the Structured Inventory of Malingering Symptoms (Smith 1997, Smith, Brugger 1997) (SIMS). In Part 2 of the study the fantasy instruments included: interrogatory suggestibility as measured with the Gudjonsson Suggestibility Scale (Gudjonsson 1984) (GSS) and the tendency to create false memories as measured with the Deese Roedinger McDermott (Deese 1959, Roediger, McDermott 1995) (DRM).

### ***Other Measures***

In Part 2 of the study the Vragenlijst Kenmerken Persoonlijkheid (Duijsens, Eurelings-Bontekoe & Diekstra 1996) (VKP; Questionnaire Personality Characteristics) was included to assess personality disorders characteristics because DID has high comorbidity levels with Axis II disorders (Dell 1998). The Positive And Negative Syndrome Scale (Kay, Fiszbein & Opler 1987) (PANSS) measures symptom severity related to schizophrenia and was included since overlap between psychotic and dissociative disorders has been described (Moskowitz, Schafer & Dorahy 2008, Perona-Garcelan et al. 2012, Varese, Barkus & Bentall 2012) and differentiating between diagnoses can be challenging.

### Statistical analyses

Data was analysed using SPSS 20 (IBM Statistics). 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 comparison 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  $\leq 0.0056$ .  $P$ -value  $< 0.01$  is reported as a trend. Post-hoc correction was applied:  $p$ -value  $0.05/\#$  of comparisons (4) =  $p$ -value  $\leq 0.0125$ .  $P$ -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 (1), DID-S (2) and controls (3)) 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 x PS. For Part 2, Bonferroni multiple comparisons correction was applied:  $p$ -value  $0.05/\#$  of questionnaires (6) =  $p$ -value  $\leq 0.0083$ .  $P$ -value  $< 0.01$  is reported as a trend. Post-hoc correction was applied:  $p$ -value  $0.05/\#$  of comparisons (2) =  $p$ -value  $\leq 0.025$ .  $P$ -value  $< 0.05$  is reported as a trend. Statistical tests were two-tailed.

## RESULTS

Table 2.1 provides an overview of the main findings from the trauma, fantasy and other measures in this study.

Table 2.1 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	
<b>Demographics</b>				
	Age & Education	No group differences	x	
<b>Trauma</b>	<b>Symptom measures</b>			
	Dissociation (DES)	DID-G > DID-S	TM	
	Somatoform dissociation (SDQ-20)	DID-G > PTSD		
	Anxiety (STAI-T)	DID-G > HC		
	Depersonalization (CDS)	PTSD > HC		
	<b>Retrospective trauma measures</b>			
	Traumatization (TEC)	DID-G > DID-S DID-G > PTSD DID-G > HC PTSD > HC	TM	
	Parental bonding (PBI)	DID-G > DID-S DID-G > PTSD* DID-G > HC PTSD = HC	TM	
	<b>Fantasy</b>	<b>Fantasy related symptom measures</b>		
		Sleep disturbances general (ISES)	DID-G > DID-S DID-G > HC DID-G = PTSD PTSD > HC	TM
Lucid dreams (ISES)		No group differences	TM	
Fantasy proneness (CEQ)		DID-G = DID-S DID-G = PTSD DID-G > HC PTSD > HC	TM	

Table 2.1 Continued

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
	Malingering total (SIMS)	DID-G > DID-S DID-G > PTSD DID-G > HC PTSD > HC	FM and TM
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
<b>Trauma</b>			
	Trauma related symptom measures		
	Depression (BDI)	DID-G > DID-S DID-G > PTSD/HC TPS > NPS	TM
	Retrospective trauma measures		
	Childhood trauma CTQ	DID-G > DID-S DID-G > PTSD/HC TPS > NPS	TM
<b>Fantasy</b>			
	Fantasy related symptom measures		
	Suggestibility total (GSS)	No group differences	TM
	<i>Recall</i>	DID-G < DID-S DID-G < PTSD and HC NPS > TPS	TM
	False memories (DRM)	No group differences	TM
	<i>Recall</i>	DID-G < DID-S	TM
<b>Other measures</b>			
	Personality characteristics (VKP)	DID-G versus DID-S inconclusive DID-G > PTSD and HC TPS > NPS	TM
	Psychotic symptoms (PANSS)	DID-G > DID-S <sup>A</sup> DID-G > PTSD and HC TPS > NPS	TM

## Abbreviations:

*DID-G = Dissociative Identity Disorder – diagnosed genuine patients; DID-S = DID simulating healthy controls; PTSD = Posttraumatic 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*

### Part 1: Group comparisons

Table 2.2 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 2.2).

#### *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 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 to 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.

Table 2.2 Results ANOVA part 1

					ANOVA/Kruskal Wallis	
	DID-G (n=17)	DID-S (n=16)	PTSD (n=16)	HC (n=16)	Statistic	P-value
<b>Demographics</b>						
Age (yrs)	43.88 (9.86)	40.51 (12.94)	40.80 (12.10)	43.59 (11.68)	F(3,61)=.382	n.s.
Education (yrs)	14.88 (.99)	14.94 (1.53)	14.94 (.85)	15.25 (.58)	F(3,61)=.415	n.s.
<b>Clinical measures<sup>1</sup></b>						
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**
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**
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**
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**
Frequency	1.91 (0.51)	0.21 (0.18)	0.85 (0.44)	0.24 (0.17)	H(3)=48.49	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**
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**
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**
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**
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**
Sexual Harrasment	9.31 (4.98)	0.80 (1.61)	2.56 (2.58)	0.06 (0.25)	H(3)=34.62	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**
<b>PBI (T)</b>						
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**
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**
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**
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**
<b>ISES (F)</b>						
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**
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*
<b>SIMS total (F)</b>						
Neurologic	23.59 (7.01)	6.53 (4.75)	14.94 (6.18)	8.00 (6.18)	H(3)=34.92	p<0.001**
Affective	5.41 (2.94)	0.67 (0.82)	2.06 (1.95)	1.06 (1.65)	H(3)=29.20	p<0.001**
Psychosis	6.41 (2.29)	3.00 (1.85)	6.19 (2.04)	3.31 (1.96)	H(3)=25.58	p<0.001**
Low intelligence	3.35 (2.00)	0.47 (0.64)	0.88 (1.26)	0.31 (0.60)	H(3)=26.35	p<0.001**
Amnesia	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**

## Abbreviations:

*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; <sup>1</sup> TEC data was*

Post-hoc P-values			
DID-G vs. DID-S	DID-G vs. PTSD	DID-G vs. HC	PTSD vs. HC
U=0, Z=4.90, P<0.001^^	U=18.0, Z=4.25, P<0.001^^	U=0, Z=4.90, P<0.001^^	U=23.5, Z=3.94, P<0.001^^
U=0, Z=4.92, p<0.001^^	U=32.0, Z=3.75, P<0.001^^	U=0, Z=4.94, P<0.001^^	U=38.0, Z=3.45, p<0.001^^
U=38.5, Z=3.36, p<0.001^^	n.s.	U=20.0, Z=4.18, p<0.001^^	U=11.5, Z=4.40, p<0.001^^
U=0, Z=4.82, p<0.001^^	U=14.0, Z=4.40, p<0.001^^	U=0, Z=4.90, p<0.001^^	U=20.0, Z=4.07, p<0.001^^
U=0, Z=4.82, p<0.001^^	U=14.0, Z=4.40, p<0.001^^	U=0, Z=4.90, p<0.001^^	U=15.5, Z=4.24, p<0.001^^
U=5.0, 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^^
U=0, Z=4.77, p<0.001^^	U=25.0, Z=3.90, p<0.001^^	U=0, Z=4.85, p<0.001^^	U=5.0, Z=4.66, p<0.001^^
U=0, Z=5.34, p<0.001^^	U=56.0, Z=3.43, p=0.006^^	U=0, Z=5.32, p<0.001^^	U=61.0, Z=2.76, p=0.011^^
U=3.0, Z=5.01, p<0.001^^	U=58.5, Z=2.89, p=0.007^^	U=0, Z=5.25, p<0.001^^	U=36.0, Z=3.91, p<0.001^^
U=10.0, Z=4.82, p<0.001^^	U=26.0, Z=4.04, p<0.001^^	U=0, Z=5.01, p<0.001^^	U=55.5, Z=3.23, p=0.005^^
U=22.0, Z=4.04, p<0.001^^	U=38.0, Z=3.46, p<0.001^^	U=17.0, Z=4.60, p<0.001^^	U=42.5, Z=3.72, p=0.001^^
U=8.0, Z=4.79, p<0.001^^	U=28.0, Z=3.86, p<0.001^^	U=8.0, Z=4.99, p<0.001^^	U=56.0, Z=3.42, p=0.006^^
U=255.0, Z=4.29, p<0.001^^	n.s.	U=250.0, Z=4.11, p<0.001^^	n.s.
U=33.0, Z=3.72, p<0.001^^	U=60.0, Z=2.74, p=0.005^^	U=51.0, Z=3.07, p=0.002^^	n.s.
U=253.5, Z=4.24, p<0.001^^	U=221.0, Z=3.07, p=0.002^^	U=230.5, Z=3.41, p<0.001^^	n.s.
U=28.5, Z=3.88, p<0.001^^	U=42.5, Z=3.38, p<0.001^^	U=32.0, Z=3.75, p<0.001^^	n.s.
U=33.0, 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^^
n.s.	n.s.	U=57.5, Z=2.84, p=0.004^^	U=56.5, Z=2.72, p=0.006^^
U=8.0, Z=4.52, p<0.001^^	U=48.5, Z=3.16, p=0.001^^	U=20.0, Z=4.18, p<0.001^^	U=46.0, Z=3.10, p=0.001^^
U=12.5, Z=4.41, p<0.001^^	U=41.0, Z=3.45, p<0.001^^	U=21.5, Z=4.22, p<0.001^^	n.s.
U=28.0, Z=3.79, p<0.001^^	n.s.	U=43.5, Z=3.37, p<0.001^^	U=42.0, Z=3.28, p=0.001^^
U=26.0, Z=3.94, p<0.001^^	U=42.5, Z=3.45, p<0.001^^	U=24.0, Z=4.21, p<0.001^^	n.s.
U=25.5, Z=3.95, p<0.001^^	U=68.5, Z=2.45, p=0.014^	U=30.0, Z=3.87, p<0.001^^	n.s.

missing for 1 DID-G and 1 DID-S; STAI-T, PBI, CDS, CEQ, ISES and SIMS data was 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); n.s.= not significant

## **Part 2: Dissociative-personality-state-dependent group comparisons**

Table 2.3 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 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 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 2.3 Results repeated measures part 2

Measures	Repeated measures							Post-hoc P-values		
	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)	Statistic	P-value	DID-G vs. DID-S	DID-G vs. Controls
<b>BDI (T)</b>	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	<b>p&lt;0.001**</b>	<b>p&lt;0.001**</b>	<b>p&lt;0.001**</b>
<b>CTQ (T)</b>	86.43 (9.13)	97.14 (17.26)	40.38 (16.60)	78.94 (15.41)	60.94 (22.70)	35.94 (8.22)	Group F(2,43)=15.63 PSxGroup F(2,43)=0.85	<b>p&lt;0.001**</b> n.s.	<b>p&lt;0.001**</b>	<b>p&lt;0.001**</b>
Emotional 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)	Group F(2,43)=40.47 PSxGroup F(2,43)=6.73	<b>p&lt;0.001**</b> <b>p&lt;0.003**</b>	<b>p&lt;0.001**</b>	<b>p&lt;0.001**</b>
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)=59.00 Group F(2,43)=32.03 PSxGroup F(2,43)=3.93	<b>p&lt;0.001**</b> <b>p&lt;0.001**</b> n.s.	<b>p&lt;0.001**</b>	<b>p&lt;0.001**</b>
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)	Group F(2,43)=29.28 PSxGroup F(2,43)=4.69	<b>p&lt;0.001**</b> n.s.	<b>p&lt;0.001**</b>	<b>p&lt;0.001**</b>
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)=23.67 Group F(2,43)=13.13 PSxGroup F(2,43)=2.74	<b>p&lt;0.001**</b> <b>p&lt;0.001**</b> n.s.	<b>p&lt;0.001**</b>	<b>p&lt;0.001**</b>
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)=44.28 Group F(2,43)=24.29 PSxGroup F(2,43)=6.09	<b>p&lt;0.001**</b> <b>p&lt;0.001**</b> <b>p=0.005**</b>	<b>p&lt;0.001**</b>	<b>p&lt;0.001**</b>
<b>GSS' (F)</b>							PS F(1,43)=22.69 Group F(2,43)=14.91 PSxGroup F(2,43)=2.19	<b>p&lt;0.001**</b> n.s.	<b>p&lt;0.001**</b>	<b>p&lt;0.001**</b>
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 Group F(2,43)=9.13	<b>p&lt;0.001**</b> <b>p&lt;0.001**</b>	<b>p=0.003**</b>	<b>p&lt;0.001**</b>

Table 2.3 Continued

Measures	Repeated measures										Post-hoc P-values	
	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)	Statistic	P-value	DID-G vs. DID-S	DID-G vs. Controls		
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)	PSxGroup F(2,42)=0.40	n.s.				
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)=11.27	<b>p&lt;0.002**</b>	<b>p=0.006^^</b>	<b>p&lt;0.001^^</b>		
							Group F(2,42)=9.13	<b>p&lt;0.002**</b>				
Yield 2	5.84 (3.95)	3.54 (3.99)	5.31 (3.53)	7.06 (4.30)	4.62 (3.83)	6.75 (4.12)	PSxGroup F(2,42)=0.98	n.s.				
							PS F(1,42)=1.71	n.s.				
Shift	2.54 (2.18)	1.85 (2.15)	3.44 (2.73)	4.00 (2.90)	3.50 (3.57)	3.69 (2.98)	Group F(2,42)=0.85	n.s.				
							PSxGroup F(2,42)=3.87	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)=0.03	n.s.				
							Group F(2,42)=2.17	n.s.				
DRM <sup>2</sup> (F)	7.46 (4.66)	6.37 (1.52)	8.99 (1.72)	8.62 (1.81)	7.08 (1.78)	7.64 (1.00)	PSxGroup F(2,42)=0.41	n.s.				
							PS F(1,42)=0.51	n.s.				
Recall correct	0.58 (0.19)	0.40 (0.26)	0.53 (0.29)	0.43 (0.23)	0.53 (0.23)	0.59 (0.20)	Group F(2,42)=1.82	n.s.				
							PSxGroup F(2,42)=1.11	n.s.				
Critical lure	7.46 (4.66)	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.	<b>p&lt;0.001^^</b>	n.s.		
							Group F(2,42)=8.24	<b>p=0.001**</b>				
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)	PSxGroup F(2,42)=0.61	n.s.				
							PS F(1,42)=7.09	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)	Group F(2,42)=0.84	n.s.				
							PSxGroup F(2,42)=0.60	n.s.				

Table 2.3 Continued

Measures	Repeated measures							Post-hoc P-values		
	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)	Statistic	P-value	DID-G vs. DID-S	DID-G vs. Controls
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 Group F(2,42)=0.70 PSxGroup F(2,42)=0.66	n.s. n.s. n.s.		
<b>Recognition</b>										
Recognition critical lure (%)	0.76 (0.48)	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 Group F(2,39)=0.48 PSxGroup F(2,39)=0.95	n.s. n.s. 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 Group F(2,39)=0.71 PSxGroup F(2,39)=0.16	n.s. n.s. 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 Group F(2,39)=0.98 PSxGroup F(2,39)=0.87	n.s. n.s. 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 Group F(2,39)=0.164 PSxGroup F(2,39)=0.42	n.s. n.s. 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 Group F(2,39)=0.83 PSxGroup F(2,39)=0.026	n.s. n.s. 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 Group F(2,39)=2.18 PSxGroup F(2,39)=2.44	n.s. n.s. n.s.		

Table 2.3 Continued

Measures	Repeated measures										Post-hoc P-values	
	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)	Statistic	P-value	DID-G vs. DID-S	DID-G vs. Controls		
<b>VKP (O)</b>												
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 Group F(2,43)=4.97	<b>p&lt;0.001**</b> n.s.	n.s.	<b>p=0.004^^</b>		
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)	PSxGroup F(2,43)=3.50 PS (1,43)=22.94 Group F(2,43)=21.73	<b>p&lt;0.001**</b> <b>p&lt;0.001**</b> n.s.	n.s.	<b>p&lt;0.001^^</b>		
Schizotypal	5.14 (4.15)	10.36 (3.54)	4.13 (3.50)	9.00 (3.60)	4.50 (3.90)	0.13 (0.50)	PSxGroup F(2,43)=2.00 PS (1,43)=50.90 Group F(2,43)=19.78	<b>p&lt;0.001**</b> <b>p&lt;0.001**</b> n.s.	n.s.	<b>p&lt;0.001^^</b>		
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)	PSxGroup F(2,43)=0.13 PS (1,43)=3.01 Group F(2,43)=9.53	n.s. n.s. <b>p&lt;0.001**</b>	n.s.	<b>p=0.002^^</b>		
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)	PSxGroup F(2,43)=0.67 PS (1,43)=6.53 Group F(2,43)=8.97	n.s. n.s. <b>p&lt;0.001**</b>	n.s.	<b>p=0.001^^</b>		
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)	PSxGroup F(2,43)=0.16 PS (1,43)=9.99 Group F(2,43)=9.00	n.s. <b>p&lt;0.003**</b> <b>p&lt;0.001**</b>	n.s.	<b>p=0.011^^</b>		
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)	PSxGroup F(2,43)=2.18 PS (1,43)=17.81 Group F(2,43)=9.06	n.s. <b>p&lt;0.001**</b> <b>p&lt;0.001**</b>	p=0.045^	<b>p&lt;0.001^^</b>		
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)	PSxGroup F(2,43)=0.62 PS (1,43)=10.17 Group F(2,43)=10.72	n.s. <b>p&lt;0.003**</b> <b>p&lt;0.001**</b>	<b>p=0.022^^</b> n.s.	<b>p&lt;0.001^^</b>		
							PSxGroup F(2,43)=1.81	n.s.				

Table 2.3 Continued

Measures	Repeated measures										Post-hoc P-values	
	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)	Statistic	P-value	DID-G vs. DID-S	DID-G vs. Controls		
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	<b>p&lt;0.002**</b>	n.s.	<b>p&lt;0.004^^</b>		
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)	Group F(2.43)=6.54	<b>p=0.003**</b>	n.s.	<b>p&lt;0.001^^</b>		
							PSxGroup F(2.43)=1.30					
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)	Group F(2.43)=12.38	<b>p&lt;0.001**</b>	n.s.	<b>p&lt;0.001^^</b>		
							PSxGroup F(2.43)=1.90					
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 (1.43)=34.01	<b>p&lt;0.001**</b>	p=0.03^	<b>p&lt;0.001^^</b>		
							Group F(2.43)=7.20					
PANSS <sup>3</sup> (O)	44.70 (11.94)	64.40 (21.87)	36.44 (5.37)	52.69 (17.45)	40.17 (7.35)	30.58 (9.0)	PSxGroup F(2.43)=0.20	n.s.	<b>p=0.007^^</b>	<b>p&lt;0.001^^</b>		
							PS F(1.43)=32.00					
Total							Group F(2.43)=23.16	<b>p&lt;0.001**</b>				
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)	PSxGroup F(2.43)=110	n.s.	<b>p=0.025^^</b>	<b>p&lt;0.001^^</b>		
							PS F(1.35)=44.24					
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)	Group F(2.35)=8.94	<b>p&lt;0.001**</b>	n.s.	<b>p=0.001^^</b>		
							PSxGroup F(2.35)=1.57					
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)=14.37	<b>p=0.001**</b>	n.s.	<b>p&lt;0.001^^</b>		
							Group F(2.35)=12.71					
							PSxGroup F(2.35)=0.51	n.s.				
							Group F(2.35)=6.56	<b>p&lt;0.001**</b>				
							PSxGroup F(2.35)=3.52	n.s.				
							PS F(1.35)=40.58	<b>p&lt;0.001**</b>				
							Group F(2.35)=6.85	<b>p=0.003**</b>				
							PSxGroup F(2.35)=0.45	n.s.				

## Abbreviations:

*DID-G-NPS* = Dissociative Identity Disorder – diagnosed genuine patients - neutral personality state; *DID-G-TP S* = 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* = Posttraumatic 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; <sup>1</sup> *GSS: Recognition 2, Yield 1 and 2, Shift and Total suggestibility was missing for 1 DID-G;* <sup>2</sup> *DRM recall data was missing for 1 DID-G and DRM recognition for 2 DID-G, 1 DID-S and 1 HC;* <sup>3</sup> *PANSS data was missing for 4 DID-G and 4 HC;* \*\* *P-value*  $\leq 0.0083$ ; ^^ *P-value*  $\leq 0.025$ ; ^ *P-value*  $< 0.05$  (a trend); *n.s.* = not significant

### ***Fantasy model***

*Do 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 (that is PTSD) scored better than NPS (that is HC), as was reflected in a group x 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 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, Schizotypal, 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 ( $p < 0.05$ ).

For the measures of positive and negative syndromes of schizophrenia (Positive and Negative 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 dissociative identity disorder (DID): the trauma model versus 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 posttraumatic 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 4 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 apparently normal self 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. (2014), 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 (Putnam et al. 1986, Boon, Draijer 1993b, Brand, Chasson 2015). 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 (Kluft 1987, Ross

et al. 1990, Ellason, Ross 1995). 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, amnesia is a required diagnostic symptom of DID (American Psychiatric Association 2013), it is even pathognomic for DID. 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 if 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 (Ohayon, Shapiro 2000, Watson 2001, Agargun et al. 2003). 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 (Van Heugten-van der Kloet et al. 2014) 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 (Watson 2001, Koffel, Watson 2009). However, the more controllable, lucid dreams, are only weakly related to dissociative symptoms (Watson 2001). 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 (that is false positives) but not omission memory errors (that is false negatives) (Lynn et al. 2012, Holmes et al. 2005). 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 (Giesbrecht et al. 2008). The lack of commission errors in DRM studies may be due to the DRM's false recognition task being fundamentally related to encoding errors (Roediger, McDermott & Robinson 1998). 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 (Van der Hart, Nijenhuis & Steele 2005) and is supportive of a continuum of trauma related disorders (Boon, Draijer 1993a, Spiegel 1984, Van der Hart, Nijenhuis & Steele 2005). 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 over-estimates of these experiences. This caveat applies to all retrospective studies that include reports of childhood trauma (see for example (Sar et al. 2004)). 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 (Draijer, Langeland 1999), and is consistent with ideas from the trauma model. Draijer & Langeland (1999) showed that dissociation is related to neglect as well as childhood trauma. 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. Since the TPS of the DID-G group is more consciously aware of their traumatic experiences (Van der Hart, Nijenhuis & Steele 2005), it is important to investigate dissociative-personality-state-dependent retrospective reports of childhood trauma (Reinders et al. 2003, Reinders et al. 2014). These findings are predicted by the trauma model and they are consistent with the clinical profile of DID (Van der Hart, Nijenhuis & Steele 2006).

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 (Dorahy et al. 2009). Past research has found that childhood trauma is positively associated with dissociation, hallucinations and delusions (Read et al. 2005, Daalman et al. 2012, Varese, Barkus & Bentall 2012, Dorahy et al. 2009). Dissociation, however, does not seem to affect reality testing (Varese, Barkus & Bentall 2012). 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 if the generally higher scores for the DID-G group could be interpreted as supporting the

trauma model since high comorbidity of personality disorders is common in individuals with DID (Ellason, Ross & Fuchs 1996, Dell 1998). TPS exhibited even higher scores than NPS, which is consistent with research showing that personality disorders are common in highly traumatized samples (Allen, Huntoon & Evans 1999, Herman, Perry & Van der Kolk 1989), as severe trauma 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 (Van der Hart, Nijenhuis & Steele 2006) and that there are psychiatric patients who imitate DID, often truly believing they have the disorder when in fact they do not (Draijer, Boon 1999). Even if DID symptoms can be simulated and reinforced iatrogenically (Spanos 1994) in some cases, it does not prove that genuine trauma-related DID does not exist (Elzinga, Van Dyck & Spinhoven 1998).

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 (Draijer, Boon 1999). 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 since 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 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 (Galbraith, Neubauer 2000, Bozkurt et al. 2014), therefore future studies need to use other comparison groups to determine if 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 DID patients were reported in previous studies (Ross, Norton 1989, Loewenstein, Putnam 1990).

### **Conclusion**

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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SUPPLEMENTARY MATERIAL  
FOR CHAPTER 2 ENTITLED



IS IT TRAUMA OR FANTASY-BASED?  
COMPARING DISSOCIATIVE IDENTITY DISORDER,  
POSTTRAUMATIC STRESS DISORDER,  
SIMULATORS, AND CONTROLS

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### **S2.1 Definition of dissociation**

Many divergent experiences have been described as dissociative, ranging from normal failures in attention to the breakdown of memory processes as seen in dissociative disorders. There is no unanimous agreement on the meaning of the term dissociation and therefore an attempt to provide some clarity has been made as follows. The term dissociation is, in psychopathology, essentially used to define three different yet related concepts (Farina, Liotti 2013): 1) a diagnostic category, dissociative disorders (DD) of the ICD-10 and DSM-5; 2) a group of symptoms, dissociative in nature such as amnesia or derealisation; 3) some pathogenic processes caused by traumatic experiences interfering with the integration of mental functions.

Dissociation can be broadly defined as a structured separation of mental processes that are ordinarily integrated (Spiegel, Cardena 1991). Dissociation as in dissociative identity disorder (DID) appears to serve as an automatic defence mechanism which reduces the impact of highly aversive or traumatic events (Van IJzendoorn, Schuengel 1996). Boon and Draijer (1993) noted that the assumption of a dissociative continuum, ranging from 'normal' forms of dissociation to pathological dissociation such as found in DID, is not supported on phenomenological grounds, and pathological dissociation seems either present or absent. Furthermore, the dissociative continuum model is in contrast with Janet's original ideas (Janet 1907) in which dissociative states are regarded as discrete pathological states and dissociation is defined as a lack of integration among two or more different "systems of ideas and functions that constitute personality" (p332) (Nijenhuis, Van der Hart 2011).

Whereas DID concerns a pathological form of dissociation, studies by proponents of the fantasy model mainly studied dissociative symptoms as measured by the Dissociative Experiences Questionnaire (DES) (Merckelbach, Horselenberg & Schmidt 2002, Giesbrecht, Merckelbach 2004, Giesbrecht et al. 2007, Rassin, Merckelbach & Spaan 2001) in samples of college students. Given the above described distinction between 'normal' and pathological forms of dissociation, findings related to the first cannot be generalized to the latter. It is therefore of importance to study various trauma and fantasy measures in a pathological dissociation group in comparison to several control groups.

## S2.2 Characteristics of DID-G and DID-S personality states

In our study, individuals with DID reported an average of 17 personality states (SD= 11.43). Coons (1998) described an average of 13 altered personality states in DID. Therapy duration is usually lengthy for individuals with DID, with an average of 8.13 years (SD 5.24) in therapy for our sample, and comorbidity is generally high (Ellason, Ross 1997, Sar et al. 2004, Sar et al. 2006, Rodewald et al. 2011, Ross, Ferrell & Schroeder 2014, Bozkurt et al. 2014). The diagnosis of DID was assessed using the Structural Clinical Interview for DSM-IV Dissociative Disorders (Steinberg 1993) (SCID-D; Dutch translation (Boon, Draijer 1994)) during which PTSD comorbidity was assessed as well. The evaluation revealed that all individuals with DID met criteria for either current comorbid PTSD (82.35%) or PTSD in remission (17.65%). The personal therapists of participants with DID reported the following co-morbid disorders, based on clinical DSM-IV classification (American Psychiatric Association 2000): chronic PTSD (n=3), PTSD (n=3), somatoform disorder (n=2), recurrent major depression (n=4), dysthymic disorder (n=1), trauma-related specific phobias (n=2), personality disorder- not otherwise specified (n=2), mixed personality disorders (n=2), borderline personality disorder symptoms (n=3), dependent personality disorder symptoms (n=1), histrionic personality disorder symptoms (n=1) eating disorder (n=2), sleeping disorder (n=2) and catalepsy (n=1). Comorbidity has been described in other work by our group as well (Chalavi et al. 2014, Chalavi et al. 2015).

Reinders et al. (2008, 2012) noted that in DID research, types of dissociative personality states of those participating in empirical studies are usually not assessed. Therefore, it was recommended that in future DID research the types of dissociative personality states were verified and reported. This is in line with suggestions of Dorahy et al. (2004, 2014). Therefore, we provide descriptions of the dissociative personality states of patients and simulating controls who participated in our study. These reported differences coincide with theoretical differences (Van der Hart, Nijenhuis & Steele 2006). Descriptions of neutral personality states (NPS) and trauma-related personality states (TPS) are given in Table S2.1. Table S2.1 provides the subjectively reported personality state characteristics from the genuine dissociative identity disorder (DID-G) participants and DID simulating healthy controls (DID-S). For reasons of privacy, many characteristics have been categorized.

For subjective age, the two factors group (DID-G (1) and DID-S (2)) and

personality state (NPS and TPS) were tested in a repeated measures ANOVA design. A significant main effect of personality state was found ( $p < 0.001$ ), with higher scores for NPS. A trend ( $p < 0.05$ ) was found for main effect of group, with higher reported subjective age in the DID-S group.

In both the DID-G and DID-S groups, 4 TPS reported to be a girl. In the DID-G group 1 NPS described gender as neutral and 1 as male/female, so a bit of both. In the DID-S group 1 TPS reported to be male. All others referred to themselves as female. With regard to ethnicity, all individuals with DID-G reported to be Caucasian, except for 3 TPS, who stated to be unaware of their ethnicity. In the DID-S group Caucasian was predominantly reported as well. Two participants from the DID-S group reported to be unaware of ethnicity, both in their NPS and TPS. One TPS of DID-S described herself as Moluccan. Reported personal length was different for NPS and TPS in 9 individuals with DID-G and in 10 DID-S participants. Reported weight seemed to be related to perceived length in the DID-G group, since the same individuals with DID-G that reported length differences between NPS and TPS did report differences for weight. In the DID-S group a comparable pattern was found with 1 additional DID-S participant reporting weight differences between NPS and TPS with length recorded equal between both personality states. Hair color was reported to be different between NPS and TPS in 9 individuals with DID-G and 13 individuals in the DID-S group. Eye color varied to a lesser extent in the DID-G group, where 4 participants reported personality-state differences for this characteristic and 10 individuals from the DID-S group reported differences. Individuals with DID-G were mostly right handed in both personality states ( $n=11$ ), 2 individuals with DID-G reported to be left handed in both NPS and TPS, and 1 DID-G participant reported that NPS was right handed and TPS was left handed. All individuals in the DID-S group described themselves as being right handed. Occupation was reported to be none or unknown in 8 TPS of the DID-G group and 6 NPS. 1 NPS and 4 TPS of the DID-G group reported to be student. In the DID-S group all the participants reported to be employed with 2 NPS and 1 TPS reported occupation to be unknown. 3 NPS and 7 TPS of the DID-S group reported to be a student. Place of residency differed between NPS and TPS in 9 individuals with DID-G and in 9 individuals from the DID-S group as well. Marital status was different for NPS and TPS in 7 DID-G participants and in 13 DID-S participants. Reported number of children differed between personality states in 8 individuals with DID-G and in 6 DID-S participants. Hobbies differed between NPS and TPS

for all individuals within the DID-G group (except 1 who reported unknown in both states). 5 TPS of individuals with DID-G reported to have no hobbies. In the DID-S group personality-state differences in hobbies were reported for 13 participants. With regard to usual mood in individuals with DID-G, NPS reported the category happy more often (n=6) than TPS (n=1). TPS more often reported sad (n=7) compared with NPS (n=1). Anxiety was reported in 3 NPS and 4 TPS of the DID-G group. 7 NPS of the DID-G group reported neutral, but no TPS of the DID-G group reported this mood category. 1 NPS of the DID-G group reported anger. For the DID-S group, 8 NPS reported happy, whereas no TPS reported this category. Anxiety was reported in 4 NPS and 5 TPS of DID-S participants. In the DID-S group the mood sad was reported only in 1 TPS. 2 NPS of the DID-S group reported the category neutral, whereas no TPS did. 1 NPS and 6 TPS of the DID-S group reported feelings of anger.

In sum, global patterns of subjectively reported personality-state characteristics seem to be comparable between the DID-G and DID-S groups. However, a few remarkable differences can be seen for subjective age (lower in TPS of the DID-G group), eye color differences (less in the DID-G group), occupation (more often 'none' in TPS of the DID-G group) and usual mood, mainly for the categories sad, angry and neutral.

Table S2.1 Subjectively reported personality-state characteristics

Name	Gender	Age	Ethnicity	Length	Weight	Hair color	Eye color	Hand- edness	Occupation	Residency	Marital Status	Children	Hobbies	Usual mood
DID-G														
1-NPS	female	26	Caucasian	L	W	H	E	R	student	R	unmarried	0	SE	Ha
1-TPS	female	14	Caucasian	nL	nW	H	nE	R	none	nR	unmarried	0	NO	Sa
2-NPS	neutral	46	Caucasian	L	W	H	E	R	none	r	married	0	CR	Neu, Sa
2-TPS	female	25	Caucasian	nL	nW	nH	E	R	none	nR	unmarried	many	NO	Sto
3-NPS	female	21	Caucasian	L	W	H	E	R	none	R	single	0	SO, RE	Ha
3-TPS	female	10	Caucasian	nL	nW	H	E	R	student	nR	unmarried	0	IN, CR, FA	Anx
4-NPS	female	20	Caucasian	L	W	H	E	R	none	R	unmarried	9	SO	Neu, Anx
4-TPS	female	13	Caucasian	nL	nW	nH	E	R	none	R	unmarried	0	NO	Gu
5-NPS	female	36	Caucasian	L	W	H	E	R	housing supervisor	R	unmarried	0	PA, SO, NA	Ha
5-TPS	female	16	Caucasian	L	W	nH	E	R	sex worker	R	unmarried	0	NA	Gu, Sa
6-NPS	female	40	Caucasian	L	W	H	E	R	health insurance act	R	unmarried	0	RE	Neu
6-TPS	female	8 <sup>^</sup>	Caucasian	L	W	H	E	R	none	nR	unmarried	0	AR, CR, NA	Ha
7-NPS	female	55	Caucasian	L	W	H	E	R	health insurance act	R	single	2	PA, RE, MU	Neu
7-TPS	female*	12	Caucasian	nL	nW	nH	E	R	student	nR	single	0	RE	Sto
8-NPS	female	23	Caucasian	L	W	H	E	L	social worker	R	unmarried	0	PA, MU	Neu, Ha
8-TPS	female*	7 <sup>^</sup>	U	nL	nW	nH	nE	L	student	nR	U	U	SE	Sa, Anx
9-NPS	female	45	Caucasian	U	U	U	U	R	U	U	unmarried	0	U	U
9-TPS	male	17	Caucasian	U	U	U	U	R	student	U	unmarried	0	U	U
10-NPS	female	49	Caucasian	L	W	H	E	R	nurse	R	married	2	MU, RE, NA, NW	Various

Table S2.1 Continued

Name	Gender	Age	Ethnicity	Length	Weight	Hair color	Eye color	Handedness	Occupation	Residency	Marital Status	Children	Hobbies	Usual mood
10-TPS	female*	13	U	nL	nW	nH	E	R	student	R	single	0	NO	Sa, Ang
11-NPS	male/ female	23	Caucasian	L	W	h	E	R	U*	R	unmarried	1	CR	Ha, Anx
11-TPS	female*	11	Caucasian	nL	nW	nH	E	R	none	nR	single	U	NW, MU, PA	Sa
12-NPS	female	32	Caucasian	L	W	H	E	R	financial administration	R	single	0	RE, CR, NW	Ha, Anx
12-TPS	female	U	U	U	U	U	U	L	U	nR	U	U	U	Anx, Sa
13-NPS	female	63	Caucasian	L	W	H	E	R	none	R	unmarried	0	PA, RE, NW	Neu
13-TPS	female	15	Caucasian	nL	nW	nH	nE	R	U	R	single	U	U	Sa
14-NPS	female	30	Caucasian	L	W	H	E	L	none	R	unmarried	0	RE	Neu
14-TPS	female	14	Caucasian	U	U	nH	nE	L	U	nR	unmarried	0	NO	Anx
DID-S														
1-NPS	female	35	U	L	W	H	E	R	trainer	R	living together	0	PA	Ha
1-TPS	female	30	U	L	nW	nH	E	R	manager	nR	single	0	PA	Anx
2-NPS	female	21	Caucasian	L	W	H	E	R	student	R	unmarried	0	PA, MU, SO	Ha
2-TPS	female	38	Caucasian	nL	nW	nH	nE	R	dogs trainer	R	unmarried	0	AN, MO, PA	Sto
3-NPS	female*	11	Caucasian	L	U	H	E	R	student	R	unmarried	0	RE, PA	Ha
3-TPS	male	22	Caucasian	nL	nW	nH	E	R	student	nR	single	0	NO	Anx, Ang
4-NPS	female	53	Caucasian	L	W	H	E	R	volunteer	R	widow	0	CR, SO, NW	Neu
4-TPS	female	24	Caucasian	L	W	nH	E	R	student	nR	single	0	NO	Sto
5-NPS	female	53	Caucasian	L	W	H	E	R	railway guard	R	married	0	NA, RE	Neu

Table S2.1 Continued

Name	Gender	Age	Ethnicity	Length	Weight	Hair color	Eye color	Hand- edness	Occupation	Residency	Marital Status	Chil- dren	Hobbies	Usual mood
5-TPS	female	47	Caucasian	nL	nW	nH	nE	R	taxi driver	R	single	0	PA	Ang
6-NPS	female	59	Caucasian	L	W	H	E	R	teacher	R	married	2	NW, RE, NA	Anx
6-TPS	female	15	Moluccan	nL	nW	nH	nE	R	student	nR	single	0	PA	Ang
7-NPS	female	29	Caucasian	L	W	H	E	R	teacher	R	single	0	MO	Ha
7-TPS	female	40	Caucasian	nL	nW	nH	nE	R	housewife	nR	married	3	CR	Ang
8-NPS	female	42	U	L	W	H	E	R	mother	R	married	2	PA, CR	Anx, Ha
8-TPS	female	16	U	nL	nW	nH	nE	R	student	R	single	0	RE, MO, MU, CR	Sto, Ang
9-NPS	female	30	Caucasian	U	U	U	U	R	U	R	single	0	U	Gu
9-TPS	female*	16	Caucasian	U	U	U	U	R	student	R	single	0	MU	Ang
10-NPS	female	43	Caucasian	L	W	H	E	R	manager	R	divorced	2	RE, CR, PA	Ha, Ang
10-TPS	female	15	Caucasian	nL	nW	nH	nE	R	student	nR	single	U	AN, MO	Sa
11-NPS	female	49	Caucasian	L	W	H	E	R	healthcare professional	R	unmarried	0	CR, RE, PA	Ha, Anx
11-TPS	female	19	Caucasian	nL	nW	nH	nE	R	cashier	nR	single	U	SE, SO	Anx, Sto
12-NPS	female	19	Caucasian	L	W	H	E	R	employee sun studio	R	single	0	SO	Sto
12-TPS	female	52	Caucasian	nL	nW	nH	nE	R	cashier	nR	living together	0	CR	Sto
13-NPS	female	25	Caucasian	U	U	U	U	R	U	U	unmarried	0	U	U
13-TPS	female	37	Caucasian	U	U	U	U	R	U	U	unmarried	0	U	U
14-NPS	female	32	Caucasian	L	W	H	E	R	teacher	R	married	2	NW, CR	Ha
14-TPS	female	40	Caucasian	L	W	nH	nE	R	cashier	nR	single	U	MO, CR	Anx
15-NPS	female	48	Caucasian	L	W	H	E	R	healthcare supervisor	R	divorced	0	CR, MU	Anx

Table S2.1 Continued

Name	Gender	Age	Ethnicity	Length	Weight	Hair color	Eye color	Handedness	Occupation	Residency	Marital Status	Children	Hobbies	Usual mood
15-TPS	female*	17	Caucasian	nL	nW	nH	nE	R	none	R	single	0	PA	Anx
16-NPS	female	22	Caucasian	U	U	U	U	R	student	U	unmarried	0	U	U
16-TPS	female*	17	Caucasian	U	U	U	U	R	student	U	single	0	U	U

## Abbreviations:

*DID-G* = dissociative identity disorder - diagnosed genuine patients; *DID-S* = DID simulating healthy controls; *NPS* = neutral personality state; *TPS* = trauma-related personality state; *L* (Length) and *nL* (non-Length): code to mark length (differences) with *NPS* as reference point, *L-L* means length is equal in *NPS* and *TPS*, *L-nL* indicates a difference in length between both personality states; *W* (Weight) and *nW* (non-Weight): code to mark weight (differences) with *NPS* as reference point, *W-W* means weight is equal in *NPS* and *TPS*, *W-nW* indicates a difference in weight between both personality states; *H* (Hair color) and *nH* (non-Hair color): code to mark hair color (differences) with *NPS* as reference point, *H-H* means hair color is in *NPS* and *TPS*, *H-nH* indicates a difference in hair color between both personality states; *E* (Eye color) and *nE* (non-Eye color): code to mark eye color (differences) with *NPS* as reference point, *E-E* means eye color is similar in *NPS* and *TPS*, *E-nE* indicates a difference in eye color between both personality states; *L/R* = Left and right handedness, measured with Annet Scale; *R* (place of residence) and *nR* (non-place of residence): code to mark place of residence (differences) with *NPS* as reference point, *R-R* means this place is similar in *NPS* and *TPS*, *R-nR* indicates a difference between both personality states; Hobbies categories: *AN* = Animals; *CR* = Creative; *CU* = Culture; *FA* = Fantasy; *NW* = Needlework; *IN* = Internal (focused on the inside-world); *MO* = Movies; *MU* = Music; *NA* = Nature; *NO* = None; *PA* = Physical activity; *RE* = Reading; *SE* = Self-soothing; *SO* = Social; Usual mood categories: *Anx* = Anxious; *Sa* = Sad; *Gu* = Guilty/Shameful; *Ang* = Angry; *Ha* = Happy; *Neu* = Neutral; *Sto* = Stoical; *U* = Unknown; \* = reported to be a girl; U\* = Internal occupation 'the guard'; ^ = Able to read

### **S2.3 Simulation paradigm**

The controversy surrounding dissociative identity disorder (DID) centres around the disagreement of the etiology and the validity of the associated symptom profile. This has led to two opposing views: the trauma model and the fantasy model (Reinders et al. 2012, Dalenberg et al. 2012). The trauma-related explanation posits that DID is due to severe, early and chronic traumatization (Van der Hart, Nijenhuis & Steele 2005). This model states that dissociation serves a defence mechanism to create distance from the traumatizing events. Proponents of the fantasy model state that the etiopsychopathology of DID has a sociocognitive origin rather than being trauma-related (Spanos 1994, Lilienfeld et al. 1999) and can be easily simulated. Several studies of DID (Huntjens, Verschuere & McNally 2012, Reinders et al. 2012, Schlumpf et al. 2013, Schlumpf et al. 2014), but not all, have included DID simulating controls to control for sociocognitive factors. Differences between the simulated and diagnosed individuals with DID indicate that DID is not fully explained by sociocognitive factors. On the other hand, similarities between the simulated and diagnosed individuals with DID would show that some characteristics of DID can be simulated. These characteristics are not suitable to distinguish simulated from clinical DID. However, if similarities occur in the symptom profiles of individuals with simulated and diagnosed DID, firm conclusions cannot be drawn about the underlying cognitive and behavioural mechanisms driving the similarities, nor about the etiology of DID as the same behaviour or symptom can have multiple and/or different causations.

As recommended by Boysen and VanBergen (2014), we provided several key methodological controls that are important for a DID simulation protocol: 1) we provided strong motivation during simulation preparation so that simulators were motivated to effectively simulate DID; 2) we checked that simulators: 2a) followed instructions during the training phase, 2b) adequately performed their tasks during and after the simulation; 3) we carefully matched groups on demographic characteristics; 4) we used adequate sample sizes to ensure the validity of statistical conclusions. Unfortunately, due to reasons of feasibility we were unable to 5) use blinding procedures so that the experimenters were unaware of participants' diagnostic group.

## 1. Motivation of enactment

Candidate simulators were informed about the study and the importance to investigate dissociative identity disorder in further detail. All were voluntarily participating and motivated to take part in the study. After successful participation, they received a compensation of €100.

### 2a) Instructions for simulators during the training phase

DID simulating controls (DID-S) were instructed to simulate genuine DID (DID-G) in Part 2 measures according to a strict protocol. During the first phase of the training, we provided information about DID to the DID-S subjects. All DID-S subjects received written instructions (see S3a), and watched the Dutch documentary about DID (Mierendorf 1993) and the movie *Sybil* (Petrie 1976). In the second phase, the simulators were instructed by the investigators to create two dissociative personality states that they would enact and asked to complete a form (see S3b) to specify the characteristics of the two personalities they would enact. This form was carefully reviewed by the investigators (E.V. or M.G) and in case of doubt about the suitability clinical experts (N.D. or E.N) were consulted, to assure that the actors fully understood the symptom profile of DID that they needed to simulate. The form consisted of general personal information of the created dissociative personality state and additional person specific information like history and characteristics. A check was done on the capability to simulate the two different dissociative personality states based on whether the description of their neutral and painful experiences met the instructions on how to enact a DID patient.

The third phase of the training phase concerned the actual practice and training phase in which simulators were asked to enact their personality states in preparation for the actual participation in the study. In accordance with Reinders et al. (2012), simulators were trained to create and simulate a neutral personality state (NPS) that mentally avoids painful memories, and a trauma-related personality state (TPS) that is fixated on, and tends to re-experience painful memories (Van der Hart, Nijenhuis & Steele 2006). DID simulating controls were then questioned via telephone (E.V. or M.G) about how they constructed the two personality states, whether they encountered difficulties and if so, they were given support during the call to improve their role-performance as NPS and TPS. In the hour prior to the actual participation,

one of the investigators checked if the candidates experienced and judged that they were able to simulate the roles of NPS and TPS.

2b: During the assessment of Part 2 measures, the investigator checked if simulators engaged in the requested simulations by monitoring their responses and immediately after each task, the investigator checked if the simulators generally felt they had simulated the roles of NPS and TPS effectively. All controls passed these various checks. In addition, the presence of the personality state under investigation and the interference among personality states were also debriefed after each task that was performed. Using the study protocol, the investigators could structurally evaluate after each questionnaire session if the intended NPS or TPS had been present during the experimental condition.

3. Diagnosed and simulating DID are likely to come from different backgrounds. When creating a non-pathological simulation control group it is impossible to match for these sociodemographic differences. However, care can be taken to match the simulating DID group on common demographics, such as age, education and ethnicity. In the current study, DID simulating controls were recruited from acting schools, through advertisements on the website [www.theaternetwerk.nl](http://www.theaternetwerk.nl), magazines and newspapers. One of the inclusion criteria was that all the actors had at least 2 years of experience with acting, to ensure sufficient experience. Actors were carefully matched on age (DID-G: M 43.88, SD 9.86; DID-S: M 40.51, SD 12.94) and education (DID-G: M 14.88, SD 0.99; DID-S: M 14.94, SD 1.53). All individuals with genuine DID were female, hence so were all simulating controls.

4. Adequate sample sizes: the aim was to include 20 participants in each group. Eventually 17 (in DID-G) and 16 (in control groups) were included.

5. Blinding procedures: unfortunately, due to limited financial budget we were not able to enrol independent personnel, so for reasons of feasibility we were unable to use blinding procedures. Therefore, the experimenters were aware of participants' diagnostic group.

**S2.3a Instructions with DID documentary (Mierendorf 1993) -  
(unofficial translation from Dutch)**

***Instruction I***

The idea is that during the investigation you pretend to be a patient with DID. To help you prepare for your role, we have added a DVD. This will show a documentary about individuals with DID. The documentary is somewhat dramatized, but still gives a reasonable picture of what the disorder looks like. On the DVD you can see Barb, Gretchen, and John. It is not the goal that you behave exactly like these three people behave, the DVD is intended to be a general introduction. Hopefully after seeing this DVD you can imagine how a patient with DID behaves and feels. After seeing the DVD we will explain to you what to do.

>> First check the DVD

***Instruction II***

As you have seen on the DVD a DID patient has two or more personality states. Dissociative personality states each have their own way of perceiving, relating to and thinking about others and thinking and experiencing the environment and themselves. Sometimes the dissociative personality states do not (fully) know what happens when another personality state takes control over the behavior. Sometimes there is no memory for events that other personality states have experienced. It is also possible that they do know about the behavior and experiences of other personality states but they don't experience this behavior as if they are personal actions.

In this study, neutral and trauma-related personality states will be studied. The neutral personality state is a personality state that does not know about the traumatic memories or at least does not experience the memories as personal.

The trauma-related personality state is aware of traumatic memories. Based on instruction III, we ask you to think of both a neutral and a trauma-related personality state and try to feel and experience the emotions that are typical for the personality states. Just before the experiment, you will get a few minutes to switch to the role of the chosen personality.

In the weeks before the experiment we will ask you to practice the simulation of the personality states. In the last week before the experiment we ask you to practice at least three times and to take a few minutes to feel the related moods. If you have practiced a few times it is less "weird" and easier to successfully enact the dissociative personality states. This all may seem a little strange but remember that this behavior is very real for these patients. Therefore, make a real effort to behave and feel like a patient with DID.

In the video you have seen how Gretchen gets panic attacks. You do not need to simulate these attacks.

### **S2.3b Inventory for personality-state characteristics**

#### ***Instruction III***

We now ask you to think of a neutral and a trauma-related personality state who will participate in the study. Keep in mind here that both personality states should have a subjective age older than 10 years. In addition, both personality states must have sufficient reading skills.

Try to specify the characteristics of these personality states below.

#### **Neutral personality state**

1 Name of the personality state:

2 Gender:

3 Age (> 10 years):

4 Race:

5 Height:

6 Weight:

7 Hair color:

8 Eye color:

9 Occupation:

10 Income:

- 11 Place of residency:
- 12 Marital Status:
- 13 Children:
- 14 Hobbies:
- 15 Usual mood of this personality state:
- 16 Important characteristics:
- 17 Other key features:

**Trauma-related personality state**

- 1 Name of the personality state:
- 2 Gender:
- 3 Age (> 10 years):
- 4 Race:
- 5 Height:
- 6 Weight:
- 7 Hair color:
- 8 Eye color:
- 9 Occupation:
- 10 Income:
- 11 Place of residency:
- 12 Marital Status:
- 13 Children:
- 14 Hobbies:
- 15 Usual mood of this personality state:
- 16 Important characteristics:
- 17 Other key features:

.....

Thank you for completing this questionnaire. Please bring the completed questionnaire to the investigation. Remember to practice with the personality states.

## S2.4 Questionnaires

Table S2.2 shows an overview of all questionnaires per category (that is, trauma, fantasy and other).

Table S2.2 Questionnaires per category

PART 1 OF THE STUDY	PART 2 OF THE STUDY
Personality state independent:	Personality state dependent:
DID-G (as an NPS)	DID-G: NPS and TPS
DID-S (as normal selves)	DID-S: NPS and TPS (simulated)
PTSD	PTSD
HC	HC
Symptom measures:	Symptom measures:
DES (T)	BDI (T)
SDQ (T)	GSS (F)
STAI-T (T)	DRM (F)
CDS (T)	VKP (O)
ISES (F)	PANSS (O)
CEQ (F)	
SIMS (F)	
Retrospective trauma measures:	Retrospective trauma measures:
TEC (T)	CTQ (T)
PBI (T)	

### Abbreviations:

*DID-G* = dissociative identity disorder - diagnosed genuine patients; *DID-S* = DID simulating healthy controls; *PTSD* = Posttraumatic stress disorder; *HC* = healthy control; *NPS* = neutral personality state; *TPS* = trauma-related personality state; *DES* = Dissociative Experiences Scale; *SDQ* = Somatoform Dissociation Questionnaire; *TEC* = Traumatic Experiences Questionnaire; *STAI-T* = State-Trait Anxiety Inventory-Trait; *PBI* = Parental Bonding Instrument; *CDS* = Cambridge Depersonalization Scale; *ISES* = Iowa Sleep Experiences Survey; *CEQ* = Creative Experiences Questionnaire; *SIMS* = Structured Inventory of Malingering Symptoms; *CTQ* = Childhood Trauma Questionnaire; *BDI* = Beck Depression Inventory; *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; *T* = trauma measure; *F* = fantasy measure; *O* = other measure

## Trauma symptom measures

### *Part 1 of the study*

#### *Dissociative Experiences Scale (DES)*

The Dissociative Experiences Scale (Bernstein, Putnam 1986) (DES) is a 28-item measure of the frequency of dissociative experiences including depersonalization, derealisation and psychogenic amnesia. Sample items such as "Some people have the experience of looking in a mirror and not recognizing themselves" are endorsed according to the percentage of time the respondent experiences that symptom (0%= never; 100%= always). Values above 25 or 30 are thought to indicate potential dissociative psychopathology (Putnam et al. 1996). The DES shows high internal consistency, and a test-retest reliability range from 0.79 to 0.96 (Bernstein, Putnam 1986, Frischholz et al. 1990, Pitblado, Sanders 1991).

#### *Somatoform Dissociation Questionnaire (SDQ-20)*

The 20-item Somatoform Dissociation Questionnaire (Nijenhuis et al. 1996) (SDQ) provides a self-evaluation of the severity of somatoform dissociation. Items assess symptoms of analgesia, anaesthesia, motor disturbances, alternating preferences for tastes and smells, pain, and loss of consciousness. Participants respond to the stem "It sometimes happens that" with items including "I am paralyzed for a while"; "it is as if my body or a part of it has disappeared"; and "I dislike tastes that I usually like". Participants respond on a 5-point Likert scale ranging from 1 (this applies to me not at all) to 5 (this applies to me extremely). Previous studies have supported the convergent validity of the SDQ-20 with other measures of dissociation including the DES (Nijenhuis et al. 1998, Sar et al. 2000). In addition, Nijenhuis et al. (1996) found a high internal consistency of the questionnaire.

#### *State-Trait Anxiety Inventory-Trait (STAI-T)*

The trait version of Spielbergers state-trait anxiety inventory (Spielberger et al. 1983) (STAI-T) is a well-validated, 20-item questionnaire addressing the emotional aspects of anxiety targeted to the individual's general and longstanding anxiety level. Participants are instructed to rate their feelings on a 4-point Likert intensity scale, ranging from 1 (almost never) to 4 (almost

always). Examples of items are "I am a steady person", "I am feeling nervous", and "I lack self-confidence".

### ***Cambridge Depersonalization Scale (CDS)***

Participants reported the frequency and duration of depersonalization symptoms over the 'last 6 months' on the Cambridge Depersonalization Scale (Sierra, Berrios 2000) (CDS). This questionnaire consists of a 29-item scale, including items as "Parts of my body feel as if they didn't belong to me" and "Previously familiar places look unfamiliar, as if I had never seen them before". The frequency of the symptoms are reported using a Likert scale ranging from 0 (never) to 4 (all the time). The duration of the symptoms are rated from 1 (few seconds) to 6 (more than a week). Sierra and Berrios (2000) showed a high internal consistency (Cronbach's alpha=0.89) and good reliability (split-half reliability=0.92) for this questionnaire.

### ***Part 2 of the study***

#### ***Beck Depression Inventory (BDI)***

To measure the current level of depression the self-report questionnaire Beck Depression Inventory (Beck et al. 1961) (BDI) is used in this study. The questionnaire contains 21 items that are rated from 0 to 3 in terms of intensity. Items are related to symptoms and attitudes of depression, for example sense of failure, depression, mood, sleep disturbances and somatic preoccupation. Research strongly supports the BDI as a reliable and valid measure of the severity of current depression. A meta-analysis of the BDI's internal consistency estimates yielded a mean coefficient alpha of 0.86 for psychiatric patients and 0.81 for non-psychiatric subjects (Beck, Steer & Carbin 1988).

### **Retrospective trauma exposure and attachment**

#### ***Part 1 of the study***

#### ***Traumatic Experiences Checklist (TEC)***

The Traumatic Experience Checklist (Nijenhuis, Van der Hart & Kruger 2002) (TEC) is a self-report questionnaire that assesses 25 types of trauma including the age of occurrence (so both adult and childhood) and duration. Items

such as "sexual abuse (unwanted sexual acts involving physical contact) by your parents, brothers, or sisters", or "taking care of your parents and/or other children in the family when you were a child" are answered with "yes" or "no". When a participant responds affirmatively to questions, he or she is asked how old the participant was when the event happened and rates the degree of traumatic stress on a Likert scale from 1 (not) to 5 (very strong). Participants also indicate the number of perpetrators of emotional, physical, and sexual abuse. Higher scores indicate more severe trauma exposure. The internal consistency, test-retest reliability and criterion-related validity were adequate (Nijenhuis, Van der Hart & Kruger 2002).

### ***Parental Bonding Instrument (PBI)***

To assess fundamental parental styles as perceived by the child, this 25-item self-report questionnaire (Parker, Tupling & Brown 1979) (PBI) is included. Adults (over 16 years) complete the PBI for how they remember their parents during their first 16 years of life. The same items have to be completed for each parent separately. The items are divided in 'care' items (12) and 'overprotection' items (13), for example statements like "Spoke to me in a warm and friendly voice", "invaded my privacy", and "made me feel I wasn't wanted". All items are scored on a 4-point Likert scale (very like to very unlike). The questionnaire shows high test-retest reliability and concurrent and predictive validity (Parker 1989, Parker 1990).

### ***Part 2 of the study***

#### ***Childhood Trauma Questionnaire (CTQ)***

The Dutch version of the Childhood Trauma Questionnaire-Short Form (Bernstein et al. 1994, Bernstein, Fink 1998, Bernstein et al. 2003) (CTQ-SF), the Jeugd Trauma Vragenlijst (JTV) (Arntz, Wessel 1996) is structured to reflect the frequency of maltreatment experiences during childhood. The questionnaire contains 25-item to assess five types of childhood maltreatment; physical, emotional and sexual abuse, and physical and emotional neglect. Each item is rated on a 5-point Likert scale (1=never true, 2=rarely true, 3=sometimes true, 4=often true and 5=very often true). Consistent with previous findings of the English CTQ (Spinhoven et al. 2014), the JTV showed adequate internal consistency reliability and the questionnaire is able to effectively discriminate between clinical and non-clinical samples. Additionally, the JTV has proven

to be valid and reliable. Thombs et al. (Thombs et al. 2009) examined the validation of the Dutch Childhood Trauma Questionnaire-Short Form.

### **Fantasy symptom measures**

#### ***Part 1 of the study***

#### ***Iowa Sleep Experience Survey (ISES)***

Using 18 questions, the Iowa Sleep Experience Survey (Watson 2001) (ISES) measures sleeping and dreaming experiences. The ISES asks participants to rate the frequency of various sleep- and dream related experiences. Questions like "When I am in bed, I feel the presence of someone who is not there" and " I experience 29 nightmares" are scored on a 7-point scale (1=never, 2=less than once a year, 3=once or twice a year, 4=several times a year, 5=once or twice a month, 6=several times a month, 7=several times a week). The ISES is the only reliable and valid measure of the wide range of nocturnal altered-consciousness experiences.

#### ***Creative Experience Questionnaire (CEQ)***

The Creative Experiences Questionnaire (Merckelbach, Horselenberg & Muris 2001) measures developmental antecedents of fantasy proneness, profound involvement in fantasy and daydreaming, and consequences of daydreaming. The CEQ uses statements like "As a child, I had my own make believe friend or animal" and "When I think of something cold, I actually get cold" to measure fantasy proneness. The questionnaire is a Dutch 25-item self-report questionnaire in which the participant has to state with "yes" or "no" whether he or she agrees with statements like above. Findings indicate that the CEQ possesses adequate test-retest stability and internal consistency (Merckelbach, Horselenberg & Muris 2001). Furthermore, this questionnaire is strongly correlated with a concurrent measure of fantasy proneness.

#### ***Structured Inventory of Malingering Symptoms (SIMS)***

To screen for malingering of psychiatric symptoms (for example, depression and psychosis) and/or cognitive impairments (e.g., low intelligence and memory complaints), the self-report instrument 'Structured Inventory of Malingered Symptomatology (Smith 1997, Smith, Brugger 1997) (SIMS) is used.

In this questionnaire five subscales are scored including: affective disorders, psychosis, amnesic disorders, neurological impairment and low intelligence. In total 75 true-false items like "At times, I am so depressed I welcome going to bed early to 'sleep it off'", and "Sometimes my muscles go limp for no apparent reason so that my arms and legs feel as though they weigh a ton". For the Dutch translation of the scale Merckelbach and Smith (2003) reported that the SIMS shows good test-retest reliability and internal consistency.

### ***Part 2 of the study***

#### ***Gudjonsson Suggestibility Scale (GSS)***

This questionnaire (GSS) (Gudjonsson 1984) intends to measure individual differences in interrogatory suggestibility. The GSS detects two types of error naming the 'Yield' score and the 'Shift' score. The latter one related to how much subjects could be made to change their answers under the pressure of negative feedback and the first one related to how much the subjects respond to suggestive questions. The following procedure is performed; participants are instructed to remember as much as possible while they are presented with a story in the form of a narrative paragraph. Afterwards, they answer questions about the story, some of which are (mis)leading. Examples of some leading questions are "Did the woman's handbag get damaged in the struggle?" or "Did the woman hit one of the assailants with her fist or handbag?", while no such events were mentioned in the story. After completing the questions, participants are told that he or she has made a number of errors and are asked to answer the questions for a second time. Studies on the GSS have reported very high inter-rater reliability (Clare et al. 1994).

#### ***Deese-Roediger-McDermott***

The Deese-Roediger-McDermott (Deese 1959, Roediger, McDermott 1995) (DRM) is a robust and powerful method for examining the creation of false memories (Stadler, Roediger & McDermott 1999, Wright, Startup & Mathews 2005). The procedure involves presenting a set of associated words (e.g., bed, rest, awake, tired, and dream) and then asking the participant to recall these words. Participants often falsely recall a word that is highly associated with the words presented (the critical lure, e.g., 'sleep').

The ten neutral word lists that will be used are derived from lists previously employed by Peters et al. (2006). Extensive pilot work has shown that these word lists produce rates of false recall and recognition which are comparable to those reported by Roediger and McDermott (1995). The use of only neutral word lists, instead of combining them with trauma-related word lists, is justified because earlier research has shown that trauma-related word lists produced similar results regarding the creation of false memories compared with neutral word lists (Geraerts et al. 2005). Participants are instructed to study each word list after which they will be given two and a half minute to recall as many words as possible from the study phase. While writing down every word they could remember, participants will be asked to start with the words which were presented at the end, continuing with the remaining words in random order. The ten neutral word lists will be counterbalanced across participants.

Finally, a recognition task will be administered to judge the old-new existence of the words. Moreover, they will be asked to indicate how confident they are regarding their old/new judgment on a 4-point scale (1= not certain at all to 4 = very certain).

## **Other**

### ***Part 2***

#### ***Vragenlijst voor Kenmerken van de Persoonlijkheid (VKP)***

Since personality disorder comorbidity has been described in DID (Fink 1991), the Questionnaire on Personality Traits, or Vragenlijst voor Kenmerken van de Persoonlijkheid (Duijsens, Eurelings-Bontekoe & Diekstra 1996) (VKP) is a useful questionnaire to assess personality disorders. It is a self-report instrument in which 174 questions based on the criteria of both the DSM-IV personality disorders (PD) and the International Statistical Classification of Diseases and Related Health Problems (ICD-10)-PD are presented. Questions concerning about for example work, self-image, interpersonal relationships, and impulse control are included. Sample items are "I hardly ever enjoy myself" (schizoid) and "I often fail to recognize how others feel" (impulsive). Questions can be scored with 0 (not true), 1 (?), or 2 (true). Some questions have a fourth answer possibility: NA (not applicable). Twelve personality disorders according to the DSM-IV and nine personality disorders according

the ICD-10 criteria are assessed. The scores for each personality disorder are given in a categorical diagnoses (negative, probable, and positive) and a dimensional score. The VKP has a good reliability and validity (Duijsens, Eurelings-Bontekoe & Diekstra 1996).

### ***Positive and Negative Syndrome Scale (PANSS)***

The PANSS (Kay, Fiszbein & Opler 1987) measures symptom severity related to schizophrenia and is included since overlap between psychotic and dissociative disorders has been described (Perona-Garcelan et al. 2012, Varese, Barkus & Bentall 2012). The PANSS consists of 7 positive-items, 7 negative-items and 16 general psychopathology items that are scored on a 7-point Likert scale, which represent increasing levels of psychopathology: 1 = absent, 2 = minimal, 3 = mild, 4 = moderate, 5 = moderate-severe, 6 = severe, and 7 = extreme. An example of a positive item is 'Delusions': Beliefs which are unfounded, unrealistic, and idiosyncratic. Basis for rating: thought content expressed in the interview and its influence on behavior. An example of a negative item is 'Blunted affect': Diminished emotional responsiveness as characterized by a reduction in facial expression, modulation of feelings, and communicative gestures. Basis for rating: observation of physical manifestations of affective tone and emotional responsiveness during the course of interview. An example of a general psychopathology item is 'Anxiety': Subjective experience of nervousness, worry, apprehension or restlessness, ranging from excessive concern about the present or future to feelings of panic. Basis for rating: Verbal report during the course of interview and corresponding physical manifestations. The 30-item positive and negative syndrome scale is a standardized scale based on a semi-structured clinical interview that refers to a specific time period, for example the previous week.

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