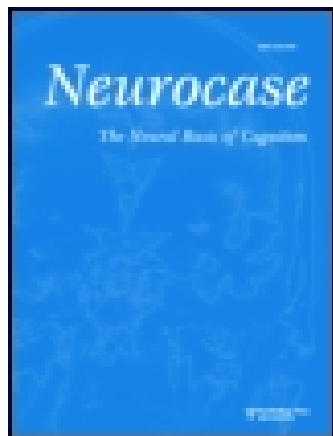


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A. A. T. Simone Reinders<sup>a b</sup>

<sup>a</sup> King's College London, Institute of Psychiatry, Division of Psychological Medicine , London, UK

<sup>b</sup> BCN Neuroimaging Center, University Medical Center Groningen, University of Groningen , Groningen, The Netherlands

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# Cross-examining dissociative identity disorder: Neuroimaging and etiology on trial

A. A. T. Simone Reinders<sup>1,2</sup>

<sup>1</sup>King's College London, Institute of Psychiatry, Division of Psychological Medicine, London, UK

<sup>2</sup>BCN Neuroimaging Center, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands

Dissociative identity disorder (DID) is probably the most disputed of psychiatric diagnoses and of psychological forensic evaluations in the legal arena. The *iatrogenic* proponents assert that DID phenomena originate from psychotherapeutic treatment while *traumagenic* proponents state that DID develops after severe and chronic childhood trauma. In addition, DID that is simulated with malingering intentions, but not stimulated by psychotherapeutic treatment, may be called *pseudogenic*. With DID gaining more interest among the general public it can be expected that the number of *pseudogenic* cases will grow and the need to distinguish between *traumagenic*, *iatrogenic* or *pseudogenic* DID will increase accordingly. This paper discusses whether brain imaging studies can inform the judiciary and/or distinguish the etiology of DID.

**Keywords:** Dissociative identity disorder; Multiple personality disorder; Neuroimaging; Iatrogenic; Traumagenic; Pseudogenic; Etiology; Aetiology; Court; Forensic.

## GENERAL INTRODUCTION

Dissociative identity disorder (DID), better known as multiple personality disorder (MPD) among non-professionals, has been of great interest to the public for over more than a century. The classic example from early fiction is of course *Dr. Jekyll and Mr. Hyde*. The continuing strong fascination of the public<sup>1</sup> with multiple personalities can be found in the recent film version of the book *The Lord of the Rings*, where in the movie the duality of the character Smeagol/Gollum receives more emphasis than in the book. The most recent of examples is the obsession of the public with the *Harry Potter* series, in which several of the characters incorporate split personalities, e.g., Voldemort, who splits

his soul into seven pieces; Harry, who houses one of them next to his own main personality; the two faces of Severus Snape and Quirrell; and Lupin in the form of a time-tested standard werewolf. Even celebrities in the music industry like Robbie Williams and Beyoncé speak about their alter egos who take care of public performances and the interaction with the media in protection of their personal identity.

The movie *Primal Fear* (1996) shows an example of how a suspect successfully malingeres by simulating DID and escapes rightful punishment. Although this specific example is fiction, it reflects the problem in real life of whether the etiology of a case of DID is traumagenic, iatrogenic or pseudogenic in court and law (Behnke, 1997). In the last 15

<sup>1</sup>For an extended list of examples of DID in fiction: [http://en.wikipedia.org/wiki/DID/MPD\\_in\\_fiction](http://en.wikipedia.org/wiki/DID/MPD_in_fiction)

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years especially, the number of forensic cases involving MPD/DID has increased substantially (Frankel & Dalenberg, 2006). In parallel, the number of published empirical studies has also increased, including those involving neuroimaging. In addition, DID is probably the most disputed of psychiatric diagnoses and of psychological forensic evaluations in the legal arena. How can the empirical studies concerning brain imaging contribute to the psychiatric field when (the etiology of) DID is still haunted with skeptics and what advice can be given to the judiciary from this neuroscientific point of view? This paper (i) provides definitions for traumagenic, iatrogenic (subconscious or conscious) and pseudogenic DID, (ii) discusses if forensic psychiatry can benefit from these empirical studies in categorizing whether a case of DID is traumagenic, iatrogenic or pseudogenic, and (iii) identifies which concerns should be kept in mind when considering neuroimaging during forensic psychiatric/psychological evaluations.

### THE IATROGENIC POSITION

The iatrogenic proponents assert that DID is manufactured during (possibly suggestive) psychotherapeutic treatment, often going hand in hand with the creation of false memories and the creation of separate and distinct identities. The iatrogenic position does include a reference to memories of a traumatic past, but it states that these are manufactured during psychotherapy, while in contrast the traumagenic view is based on the traumatic past being genuine. Indeed, from an iatrogenic view the very existence of dissociative identity states is questioned. This often leads to a biased presentation of facts, research, and/or literature (Gleaves, 1996; Pope, Barry, Bodkin, & Hudson, 2006; Spanos, 1994). Representative of the iatrogenic position, including a literature review, are papers by Piper and Merskey (2004a, 2004b, 2005), which were followed by consecutive responses from proponents of the traumagenic view (Coons, 2005; Fraser, 2005; Sar, 2005). This shows that even after the official recognition in the DSM-IV (DSM, edition IV, American Psychiatric Association, 1994), a consensus on the diagnosis and therapy of DID remains elusive and supporters of the diametrically opposed iatrogenic and traumagenic position still engage in passionate debate.

Actually, within the iatrogenic view two situations can be distinguished: (i) subjects emulate DID on a

subconscious level, or (ii) subjects emulate DID on a conscious level. In the first case, subjects are convinced (i.e., by the therapist) that they suffer from DID. Consequently, they believe that they consist of multiple personalities without having conscious control over their situation. Therapeutic dependency, high suggestibility or high fantasy proneness may contribute to the effectiveness of the therapeutic intervention in the creation of DID phenomena. In this case, subjects genuinely believe that they suffer from DID. Therefore, this is a subconscious process as they are not aware of their simulation, and in that sense the therapist bears full responsibility for the generated DID. In the second case, subjects actively simulate DID through conscious intervention to satisfy their therapist. Therefore, displaying DID symptoms is consciously chosen behaviour, but without any ulterior motive other than to please the therapist. In a more general context, conscious DID simulation is referred to as malingering and is therefore described in the pseudogenic section below. Conscious DID simulation is also increasingly included as a control situation in empirical DID research (e.g., Huntjens, 2003).

One of the best known DID cases, *Sybil* (Schreiber, 1973), has been found (Rieber, 1999) to have been a manufactured iatrogenic case of multiple personality. Rieber (1999) discovered how easily 'The fine line between self-deception and deception of others' can be crossed when wanting to make a dissociative identity disorder case 'no matter what'. *Sybil* was manufactured through hypnosis, pentothal and a close emotional involvement between subject and therapist. Using the subject's given capacity for suggestion, false memories of sexual abuse were created and the notion of multiple personality implanted.

### THE TRAUMAGENIC POSITION

When a subject is diagnosed with DID according to the official Diagnostic and Statistical Manual (DSM), edition IV (American Psychiatric Association, 1994) the case is referred to as genuine DID. According to the DSM-IV, DID is characterized by, among others, a disruption in consciousness and the presence of two or more distinct identities or personality states, also referred to as 'different emotional states', 'alters' or 'dissociative identity states'. Each of these states has its own perception of, relating to, and thinking about the environment and the self (Reinders et al., 2003).

Although these official criteria for DID do not specifically indicate a traumagenic origin (Gleaves, May, & Cardena, 2001), a history of childhood trauma is assumed to have caused the disorder. More specifically, traumagenic proponents hold that DID constitutes a severe form of post-traumatic stress disorder (PTSD). Within the traumagenic position, DID is believed to originate from a sub-conscious self-protecting reaction in order to cope with chronic, severe trauma such as persistent abuse (Nijenhuis, van der Hart, & Steele, 2002; Stickley & Nickeas, 2006). According to this traumagenic model, a subject can dissociate (i.e., mentally compartmentalize; Brown, 2006) from their painful experiences by repressing (i.e., inducing amnesia) the memories of these experiences. Dissociation and repression keep trauma-related memories out of conscious awareness to avoid (i.e., protect from) intolerable psychological distress. In this manner different personality states are created.

This theory is supported by numerous correlational studies (Bowman, Blix, & Coons, 1985; Dalenberg & Palesh, 2004; McElroy, 1992; Nijenhuis, Spinhoven, van Dyck, van der Hart, & Vanderlinden, 1998; Ross, Norton, & Wozney, 1989; Zlotnick et al., 1996). These studies usually rely on self-reports and confirm a high incidence of childhood trauma, e.g., childhood sexual abuse, physical neglect and/or emotional abuse, in adults and children with high levels of dissociation or DID. These studies are supported by recent epidemiological studies (Sar et al., 2007a; Xiao et al., 2006), which investigate the prevalence of DID and the relation to traumatic experiences in the general population. In support of the traumagenic position these studies found that pathological dissociation is more prevalent in more traumatized subsamples.

Following previously used descriptions and terminology (Reinders et al., 2003, 2006, i.e., avoiding interpretive discussions, cf. Merckelbach, Devilly, & Rassin, 2002), the dissociative identity states are indicated here as neutral identity states (NIS) and trauma-related identity states (TIS). In a NIS, DID subjects concentrate on functioning in daily life. To that end, NIS has amnesia for traumatic memories, thereby disabling recognition of the self-referential nature of trauma-related information. In contrast, the TIS does have conscious access to the traumatic memories (Dorahy, 2001; Van der Kolk & Fisler, 1995). These states do not know of each other's existence unless their treatment has progressed to phase II (Brown, Schefflin, & Hammond, 1998;

Steele, van der Hart, & Nijenhuis, 2001).<sup>2</sup> The sub-conscious co-existence of, and switching between, different states leads to reports of black-outs and amnesic periods.

Although holders of the traumagenic view usually do not deny that some symptoms or phenomena of DID can be created iatrogenically, they do stress that there is no evidence to suggest that the disorder itself can truly be created (Gleaves, 1996). On the other hand, even if DID symptoms can be created iatrogenically or enacted (Spanos, 1994) it does not mean that genuine traumagenic DID does not exist (Elzinga, Van Dyck, & Spinhoven, 1998).

## THE PSEUDOGENIC POSITION

Pseudogenic<sup>3</sup> DID includes subjects who are simulating DID without any therapeutic intervention. This is a conscious and active simulation process for secondary gain. Several and diverse reasons can underlie this active, malingering DID simulation. Needy and attention seeking behaviour (histrionic) is generally relatively harmless. However, other reasons can be less innocuous: obtaining financial, social welfare or legal benefits (Rogers, 1997). For example, by feigning DID an accused can try to deceive a jury and judge in the hope to be held not accountable or responsible for the crimes committed thereby avoiding legal consequences, especially incarceration or execution.

## DID AND JURISPRUDENCE

Merckelbach et al. (2002) distinguishes three categories of legal complications. The *first* category consists of DID subjects who start to accuse another person of severe and chronic (sexual) abuse during the subject's childhood. Almost always, objective evidence (e.g., diaries, eye-witness testimonies, written confessions or photographs taken by perpetrator) of the abuses is lacking (Piper & Merskey, 2004a). Without objective evidence the only remaining 'proof' is the (recovered) memories of childhood abuse.

<sup>2</sup>Phase II is an advanced phase of treatment which involves therapeutic exposure to traumatic memories and allows for self-initiated and self-controlled switching between dissociative identity states.

<sup>3</sup>Pseudo: fake; falsely; sham; feigned; deceptive resemblance to a specified thing.

A recent review by Laney and Loftus (2005) describes how memory is malleable and false memories can be planted, e.g., by the therapist. False memories (see for review and ethical issues: DePrince, Allard, & Oh, 2004) often include recovered memories, which are memories for which a subject claims to have been amnesic. The period of time being amnesic, i.e., the impressions of previous non-recall, has been shown to be often highly unreliable (e.g., Merckelbach et al., 2006), revealing a severe problem with the interpretation of amnesia. Interestingly, recent evidence shows that subjects who report recovered childhood trauma-related memories are more prone to falsely recalling and recognizing words (Geraerts, Smeets, Jelicic, van Heerden, & Merckelbach, 2005; Geraerts, 2006). Intriguingly, this was significantly correlated with fantasy proneness (as measured by the Creative Experiences Questionnaire, CEQ; Merckelbach, Horselenberg, & Muris, 2001) and not with dissociative symptoms (as measured by the Dissociative Experience Scale, DES; Bernstein & Putnam, 1986). Although this research did not include subjects diagnosed with DID, it supports the claims of the iatrogenic view that the creation or recovery of false memories is dependent on the level of hypnotizability, suggestibility or fantasy proneness (Merckelbach & Muris, 2001). Caution should therefore be taken when assuming a simple and direct causal relation between self-reported trauma and dissociation (Merckelbach & Muris, 2001).

The *second* category, from which legal complications may arise, is when a DID subject claims not to be responsible for crimes committed because a different identity state committed the crime and the dominant identity state claims not to be consciously aware of the crime due to inter-identity amnesia. This might hold in non-pseudogenic cases as long as the dominant identity state lacks both awareness of, and control over, the actions of that other identity state (Deeley, 2003). The *third* category (related to the second) has to do with civil rights. If 'alters' are interpreted as genuine entities, which alter serves as the legal representative of that person? Thus, who of the alters can sign a contract, give informed consent in the case of participation in a research project, or vote?

## NEUROIMAGING THE ETIOLOGY OF DID

### Imaging traumagenesis or iatrogenesis

Increasing amounts of empirical data directly or indirectly related to study the etiology of DID is

appearing in the literature. By far the most seductive development is the application of neuroimaging in psychobiological DID research. Structural magnetic resonance imaging (sMRI; Tsai, Condie, Wu, & Chang, 1999; Vermetten, Schmahl, Lindner, Loewenstein, & Bremner, 2006), functional magnetic resonance imaging (fMRI; Tsai et al., 1999), positron emission tomography (PET; Mathew, Jack, & West, 1985; Reinders, 2004; Reinders et al., 2003, 2006), single photon emission computed tomography (SPECT; Sar, Unal, Kiziltan, Kundaci, & Ozturk, 2001; Sar, Unal, & Ozturk, 2007b; Saxe, Vasile, Hill, Bloomingdale, & Van der Kolk, 1992; Sheehan, Thurber, & Sewall, 2006), event-related potentials (ERPs; Allen & Movius, 2000) and electroencephalography (EEG; e.g., Coons, Milstein, & Marley, 1982; Hughes, Kuhlman, Fichtner, & Gruenfeld, 1990; Lapointe, Crayton, DeVito, Fichtner, & Konopka, 2006; Mesulam, 1981) have been applied to chart the psychobiological constituents of DID. Details on scanning techniques, the numbers of participants (healthy controls and DID subjects), physical gender, the diagnostic tools used to diagnose DID subjects, the DIS in which the DID subject remained during data acquisition and the experimental task(s) are listed in Table 1. This table clearly shows that no convergence exists the study of DID (Barlow, 2007). Table 2 lists findings from the neuroimaging studies listed in Table 1 (independent of task, identity state, activation or deactivation, etc.) in terms of brain lobes and sites, and shows that brain research in DID has produced a wide diversity of results. Combined with the lack of convergence on, e.g., brain mapping technique, experimental task or identity state under investigation, it is difficult to speculate about the brain mechanisms involved in DID. In addition, most of these studies are performed from the traumagenic position and lack the explicit investigation of possible iatrogenic influences, i.e., none of these studies have addressed the possibility of subconscious iatrogenically induced DID.

Four studies have surpassed the limitations of case reports and accepted the challenge of including a larger group of DID subjects. The study of Sar et al. (2007b) included 21 genuine DID subjects and nine healthy controls, the study of Sar et al. (2001) included 15 genuine DID subjects and eight healthy controls, the study of Vermetten et al. (2006) included 15 genuine DID subjects and 23 controls and the study of Reinders et al. (2003, 2006) included 11 genuine DID subjects. Besides the strength of including a larger group of subjects,

**TABLE 1**  
Parameter review of neuroimaging studies on DID

<i>Technique</i>	<i>References</i>	<i>N controls (M/F)</i>	<i>N DID (M/F)</i>	<i>Diagnostic tool</i>	<i>N DIS (type)<sup>a</sup></i>	<i>Task(s)</i>
sMRI	Vermetten et al. (2006)	23 (F) <sup>*</sup>	15 (F)	SCID-D DSM-IV	Unknown	n.a.
	Tsai et al. (1999)	52 (27/25) <sup>*b</sup>	1 (F)	DSM-IV	Unknown	n.a.
fMRI	Tsai et al. (1999)	0	1 (F)	DSM-IV	2 (D + A)	DIS switching
PET	Reinders et al. (2003, 2006)	0	11 (F)	SCID-D DSM-IV	2 (NIS + TIS) <sup>c</sup>	Memory <sup>d</sup>
	Mathew et al. (1985)	3 (F) <sup>*</sup>	1 (F)	DSM-III	3 (1 D + 1 C & 1 I)	Rest
SPECT	Sar et al. (2007b)	9 (3/6) <sup>*</sup>	21 (7/14)	SCID-D DSM-IV + DES	1 (D)	Rest
	Sheehan et al. (2006)	0	1 (F)	None	2 (1 D + 1 C)	Unknown
	Sar et al. (2001)	8 (2/6) <sup>*</sup>	15 (4/11)	SCID-D DSM-IV + DES	2 (1 D + 1 A) or 1 (D) <sup>c</sup>	Rest
	Saxe et al. (1992)	0	1 (F)	Unknown	4 (unknown)	Rest
ERP	Allen et al. (2000)	60 <sup>*</sup> (unknown)	4 (F)	SCID-D DSM-IV	2 (unknown <sup>c</sup> )	Memory
EEG <sup>f</sup>	Lapointe et al. (2006)	4 <sup>*</sup> (F)	3 (F)	DSM-III-R	2 <sup>g</sup>	Rest
	Hughes et al. (1990)	1 (F) <sup>**</sup>	1 (F)	DSM-III-R	11 (1 D + 10 A) <sup>h</sup>	2 tasks <sup>i</sup>
	Coons et al. (1982)	1 (M) <sup>**</sup>	2 (F)	Unknown	4/5 (1 D + 3/4 A) <sup>j</sup>	7 tasks <sup>k</sup>
	Mesulam et al. (1981)	0	7 (F)	None	Unknown (unknown)	4 tasks <sup>l</sup>

sMRI, structural magnetic resonance imaging; fMRI, functional magnetic resonance imaging; PET, positron emission tomography; SPECT, single photon emission computed tomography; ERP, event-related potential; EEG, electroencephalogram; M, Male; F, Female; N, number; DID, dissociative identity disorder; DIS, dissociative identity state; NIS, neutral identity state, not aware of traumatic past; TIS, traumatic identity state, aware of traumatic past; SCID-D DSM-IV, structured clinical interview for DSM-IV dissociative disorders (Steinberg, 1993); DES, dissociative experience scale (Bernstein et al., 1986).

<sup>\*</sup>Healthy control subject(s) did not mimic DID subject's identity state(s).

<sup>\*\*</sup>Healthy control subject(s) did mimic DID subject's identity state(s).

<sup>a</sup>Number and type of DIS present during the measurement(s). The dominant (D) DIS refers to the personality state that covers the longest part of time throughout an ordinary day of the DID subject. The D DID is also referred to as native (Tsai et al., 1999), designated (Mathew et al., 1985), host (Sar et al., 2001, 2007b and Lapointe et al., 2006), adult (Sheehan et al., 2006), basic (Hughes et al., 1990) or primary (Coons et al., 1982, Mesulam et al., 1981). An alter (A) is a sub-dominant DIS and a child (C) alter has a subjective age of a young child. The integrated (I) state is the identity after the treatment.

<sup>b</sup>From Stern et al. (1996), i.e., literature comparison only.

<sup>c</sup>Report inter-identity amnesia for test material.

<sup>d</sup>Both NIS and TIS listened to an autobiographical neutral and trauma-related text in a symptom provocation paradigm.

<sup>e</sup>Six DID subjects were scanned once in D and twice in the same A, 9 DID subjects (D only) and the healthy controls were scanned once.

<sup>f</sup>Most commonly cited references.

<sup>g</sup>DID subject 1: DIS 1 = F (C); DIS 2 = F

DID subject 2: DIS 1 = unknown; DIS 2 = unknown

DID subject 3: DIS 1 = M; DIS 2 = F (D)

<sup>h</sup>2 C, two adolescents, seven adults (1 D).

<sup>i</sup>Eyes open and eyes closed.

<sup>j</sup>DID subject 1 and the control: 4 DIS (3 F (1 D, 1 C), 1 M)

DID subject 2: 5 DIS (3 F (1 D), 2 M)

<sup>k</sup>Awake, drowsy, sleeping, hyperventilating, photic stimulation, eyes open and eyes closed.

<sup>l</sup>Sleeping, hyperventilating, photic stimulation and nasopharyngeal leads.

some considerations should be taken into account. The studies of Sar et al. (2001, 2007b) only inform on steady state cerebral blood flow changes, i.e., a task-independent assessment of blood flow changes. In the study of Vermetten et al. (2006), the validity of the decrease in hippocampal and amygdalar volumes, when incorporating the age difference between DID subjects and the control group, has been discussed (Smeets, Jelicic, & Merckelbach, 2006; Vermetten, 2006). The PET study (Reinders, 2004; Reinders et al., 2003, 2006) applied a symptom provocation paradigm including a neutral and

a trauma-related autobiographical stimulus script, which were presented to two DIS, i.e., a NIS and TIS. This study represents a two-by-two factorial design (Friston, Price, Buechel, & Frackowiak, 1997; Price, Moore, & Friston, 1997) and allows the assessment of various effects, namely main effects (both comprising two levels: NIS and TIS), interaction effects, several possibilities for simple subtraction analysis and conjunction analysis (see Figure 6.1 in Reinders, 2004). This study was set up as a within-subject study, where subjects served as their own control. Regional cerebral

**TABLE 2**  
Brain regions found to be implicated in DID

<i>Technique</i>	<i>References</i>	<i>Frontal</i>	<i>Parietal</i>	<i>Occipital</i>	<i>Temporal</i>	<i>Amygdala</i>	<i>Hippocampus</i>
sMRI	Vermetten et al. (2006) <sup>a</sup>	x	x	x	x	R <sup>b</sup> +L	R <sup>b</sup> +L <sup>b</sup>
	Tsai et al. (1999) <sup>c</sup>	x	x	x	x	x	R+L
fMRI	Tsai et al. (1999)	—	—	—	R	—	R+L
PET	Reinders et al. (2006) <sup>d</sup>	R+L	R+L	R+L	R+L	R+L	R+L <sup>e</sup>
	Reinders et al. (2003) <sup>d</sup>	R+L	R+L	R+L	—	—	—
SPECT	Mathew et al. (1985)	—	—	—	R <sup>f</sup>	x	x
	Sar et al. (2007b)	R+L	—	R+L	—	x	x
	Sheehan et al. (2006)	—	—	—	R+L <sup>f</sup>	—	—
	Sar et al. (2001)	R+L	—	—	L	x	x
	Saxe et al. (1992)	~	~	~	L	~	~
ERP	Allen et al. (2000)	—	L+M <sup>g</sup>	—	—	x	x
EEG	Lapointe et al. (2006)	R	—	R+L	R+L	x	x
	Hughes et al. (1990)	—	R	R+L	R+L	x	x
	Coons et al. (1982)	—	R+L <sup>h</sup>	R <sup>i</sup>	L	x	x
	Mesulam et al. (1981)	—	—	—	R+L <sup>f</sup>	x	x

This table lists the location of statistically significant findings as reported in the neuroimaging studies listed in Table 1. As can be seen in Table 1 any convergence in neuroimaging studies in DID is missing. Furthermore, the spatial resolution of SPECT and EEG/ERP is poor. Therefore, this table only indicates whether or not a finding was reported in the listed brain site/lobe, i.e., it has a low spatial resolution reporting to conform to the low spatial resolution of SPECT and EEG/ERP. Listings in this table are independent of dissociative identity state, the task or paradigm under investigation, the comparison of task conditions, activation/deactivation, etc. It states only whether or not a region was found to be implicated in DID in the specific reference.

sMRI, structural magnetic resonance imaging; fMRI, functional magnetic resonance imaging; PET, positron emission tomography; SPECT, single photon emission computed tomography; ERP, event-related potential; EEG, electroencephalogram; —, was a region of interest but no significant results; x, not a region of interest; ~, unknown whether or not it was a region of interest; R, Right hemisphere; L, Left hemisphere; M, Midline.

<sup>a</sup>Manual tracing of hippocampus and amygdala.

<sup>b</sup>Not significant after adjustment for age (see Smeets et al., 2006 and Vermetten et al., 2006).

<sup>c</sup>Manual tracing of hippocampus.

<sup>d</sup>Talairach and Tournoux (1998) coordinates and Brodmann's areas in the original publication.

<sup>e</sup>Both R and L reported as parahippocampal instead of hippocampal.

<sup>f</sup>No statistical values available.

<sup>g</sup>Left posterior-parietal and posterior-parietal midline.

<sup>h</sup>Right centro-parietal+left parasagittal.

<sup>i</sup>Right parieto-occipital.

blood flow (rCBF) data revealed different neural networks to be associated with the differential processing of neutral and trauma-related memory script between NIS and TIS. The results of this study confirm inter-identity amnesia between two identity states and support the traumagenic position.

However, one could argue that the PET results might vanish when correcting for the effect of simulation or that the autobiographical memories are (recovered) false memories, as both have been postulated by holders of the iatrogenic position. The transfer of newly learned information between identity states (i.e., testing inter-identity amnesia) was tested using psychological tests (Elzinga, Phaf, Ardon, & van Dyck, 2003; Huntjens, 2003; Huntjens et al., 2002, 2005a, 2006; Huntjens, Postma, Peters, Woertman, & van der Hart, 2003; Huntjens, Postma, Woertman, van der Hart &

Peters, 2005b). While Huntjens (2003) did find an inter-identity amnesia effect for genuine DID subjects, it was only partial and did not significantly differ from that of DID simulating control subjects, demonstrating the importance of including simulating subjects. Interestingly, as the studies of Huntjens (2003) speak against a complete state-dependent separation of memories, they might shed some light on the second and third categories of legal complications (see above and Merckelbach et al., 2002).

Besides (inter-identity) amnesia, another aspect of memory functioning is the involvement of false memories, which plays a key role in DID according to holders of the iatrogenic position. Exploring the neural correlates of false memories using functional neuroimaging is pioneering research. Although the first studies with healthy controls are appearing in the literature (Moritz, Glascher, Sommer, Büchel,

& Braus, 2006), the application to psychiatric disorders like PTSD or DID is, as far as the author is aware of, nonexistent.

### Imaging deception

Pseudogenic DID involves the intention to deceive others, e.g., in the forensic setting the judge and jury, through actively malingering by simulating the disorder. Abe et al. (2006; Abe, Suzuki, Mori, Itoh, & Fujii, 2007) found, using PET, that the deception of an interrogator by making untruthful responses or telling lies involves the activation of the prefrontal cortex, anterior cingulate cortex and the amygdala. These findings are supported by pioneering fMRI studies (Kozel et al., 2005; Mohamed et al., 2006). The application of neuroimaging to investigate whether or not DID is pseudogenic looks promising on the basis of these studies. As these studies are performed in a laboratory setting with a group study of normal controls, it can be assumed that they underestimate the effects of malingering when it comes to real life and court cases. It can be expected that the emotional response and the effort to malingering in pseudogenic DID subject is greater. Both the PET and fMRI studies are pioneering multi-subject studies, which complicates the extension to a single-subject to warrant use in court (Appelbaum, 2007). Fast event-related and/or real-time fMRI on the other hand offer more potential (Haynes & Rees, 2006; Laconte, Peltier, & Hu, 2007; Langleben et al., 2005) as they can be applied in single subjects.

So, even though the developments in the field of brain imaging are interesting and promising, judicial decision-making in court cases concerning DID should incorporate the power and limitations of these techniques. When reading literature in this field, specific attention should be drawn to the possibilities *and* pitfalls of study designs in this type of published empirical research. Besides considering scientific literature during judiciary decision-making, judges or juries might be tempted to have the DID condition of the accused verified via one of the neuroimaging techniques mentioned above. However, given their limitations, such single-subject studies should strongly be discouraged. The currently available information (see Table 2) is obtained from poorly comparable brain imaging studies, which often lack methodological rigor (e.g., Tsai et al., 1999), and is therefore unsuitable for use in such delicate situations as legal proceed-

ings (Kulynych, 1996; Merckelbach et al., 2002; Patel, Meltzer, & Mayberg, 2007). Imaging may be a promising tool to explore pathogenetic mechanisms in DID but at present the literature is very limited, without a single independently confirmed finding. Therefore, I strongly recommend the establishment of a consensus on distinguishing paradigms, acknowledged by both holders of the traumagenic and iatrogenic position, which are supported by a large number of well-controlled multi-subject studies, before considering neuroimaging tools as objective measures in court. As such studies and evaluations will take a significant amount of time, the availability of neuroimaging as a forensic neurobiological evaluative tool to forensic professionals will not be as soon as hoped for by Frankel and Dalenberg (2006, pp. 174–175). In addition, it will always remain difficult to compare a specific (psychopathological) case to such a database. Testing for pseudogenic DID, through accessing deception, needs the same caution as more information about the reliability and validity is required (Appelbaum, 2007).

### CLOSING CONSIDERATIONS

As DID remains a popular topic among the general public it can be expected that (pseudogenic) DID will continue to play a role in court cases. Therefore, one of the main issues to be resolved around DID in forensic psychiatry is the etiology of the subject's DID. How can it be determined whether the origin of the subject's DID is traumagenic, iatrogenic or pseudogenic? Is the disorder genuine, subconsciously simulated or consciously malingered? And if the subject is subconsciously simulating DID due to iatrogenic intervention, who is the one to blame: subject or therapist?

Neuroimaging has been shown to be a powerful tool (Reinders et al., 2003, 2006; Sar et al., 2001, 2007b; Vermetten et al., 2006), revealing that genuine dissociative identity disorder is related to deviant amygdalar and hippocampal volumes and is characterized by at least two types of dissociative identity states: (i) dissociative identity states that process trauma-related memory as if they pertained to neutral memories, i.e., NIS, and consequently do not show differences in rCBF when listening to a trauma-related or neutral memory, and (ii) dissociative identity states fixated on, i.e., with access and responses to, traumatic memories do show differences in rCBF when listening to a



trauma-related memory as compared to a neutral memory. Unfortunately, these studies do not inform us about the different neural correlates in relation to a traumagenic, iatrogenic and/or pseudogenic etiology of DID.

With the number of forensic cases involving DID increasing dramatically (Frankel & Dalenberg, 2006), convergence on diagnosing DID and distinguishing on the basis of etiology is needed. However, as long as there are no widely accepted methods and designs for (functional) neuroimaging case studies, for determining the neural correlates of the etiology of DID, severe caution is needed with regard to its use in court. Nevertheless, objectively measuring brain activation and structural patterns is one of the most promising directions for future scientific research. Such objective measures should be preferred over subjective measures as evidence in the courtroom, since the latter have been shown to be incapable of successfully identifying between genuine DID subjects and well-instructed simulating controls (Brand et al., 2006). Considering the rarity of empirical research conforming to methodological rigor, ethics and justice dictate that we keep an open mind and to consider all three possibilities, i.e., traumagenic, iatrogenic or pseudogenic, as the etiology of DID instead of choosing a position on the basis of emotion or prejudice.

## REFERENCES

- Abe, N., Suzuki, M., Tsukiura, T., Mori, E., Yamaguchi, K., Itoh, M., & Fujii, T. (2006). Dissociable roles of prefrontal and anterior cingulate cortices in deception. *Cerebral Cortex*, 16(2), 192–199.
- Abe, N., Suzuki, M., Mori, E., Itoh, M., & Fujii, T. (2007). Deceiving others: Distinct neural responses of the prefrontal cortex and amygdala in simple fabrication and deception with social interactions. *Journal of Computational Neurology*, 19(2), 287–295.
- Allen, J. J., & Movius, H. L. (2000). The objective assessment of amnesia in dissociative identity disorder using event-related potentials. *International Journal of Psychophysiology*, 38(1), 21–41.
- American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.). Washington, DC: American Psychiatric Press.
- Appelbaum, P. S. (2007). Law & psychiatry: The new lie detectors: Neuroscience, deception, and the courts. *Psychiatric Services*, 58(4), 460–462.
- Barlow, M. R. (2007). Researching dissociative identity disorder: Practical suggestions and ethical implications. *Journal of Trauma & Dissociation*, 8(1), 81–96.
- Behnke, S. H. (1997). Confusion in the courtroom: How judges have assessed the criminal responsibility of individuals with multiple personality disorder. *International Journal of Law and Psychiatry*, 20(3), 293–310.
- Bernstein, E. M., & Putnam, F. W. (1986). Development, reliability and validity of a dissociation scale. *The Journal of Nervous and Mental Disease*, 174, 727–735.
- Bowman, E. S., Blix, S., & Coons, P. M. (1985). Multiple personality in adolescence: Relationship to incestual experiences. *Journal of the American Academy of Child Psychiatry*, 24(1), 109–114.
- Brand, B. L., McNary, S. W., Loewenstein, R. J., Kolos, A. C., & Barr, S. R. (2006). Assessment of genuine and simulated dissociative identity disorder on the structured interview of reported symptoms. *Journal of Trauma & Dissociation*, 7(1), 63–85.
- Brown, R. J. (2006). Different types of ‘dissociation’ have different psychological mechanisms. *Journal of Trauma & Dissociation*, 7(4), 7–28.
- Brown, D., Schefflin, A., & Hammond, D. (1998). *Memory, trauma treatment, and the law*. New York: Norton.
- Coons, P. M. (2005). Re: The persistence of folly: A critical examination of dissociative identity disorder. *Canadian Journal of Psychiatry*, 50(12), 813 (Comment).
- Coons, P. M., Milstein, V., & Marley, C. (1982). EEG studies of two multiple personalities and a control. *Archives of General Psychiatry*, 39(7), 823–825.
- Dalenberg, C. J., & Palesh, O. G. (2004). Relationship between child abuse history, trauma, and dissociation in Russian college students. *Child Abuse & Neglect*, 28(4), 461–474.
- Deeley, P. Q. (2003). Social, cognitive, and neural constraints on subjectivity and agency: Implications for dissociative identity disorder. *Philosophy, Psychiatry and Psychology*, 10(2), 161–167.
- DePrince, A. P., Allard, C. B., & Oh, H. (2004). What’s in a name for memory errors? Implications and ethical issues arising from the use of the term ‘False Memory’ for errors in memory for details. *Ethics & Behavior*, 14(3), 201–233.
- Dorahy, M. J. (2001). Dissociative identity disorder and memory dysfunction: The current state of experimental research and its future directions. *Clinical Psychology Review*, 21(5), 771–795.
- Elzinga, B. M., Van Dyck, R., & Spinhoven, P. (1998). Three controversies about dissociative identity disorder. *Clinical Psychology and Psychotherapy*, 5(1), 13–23.
- Elzinga, B. M., Phaf, R. H., Ardon, A. M., & van Dyck, R. (2003). Directed forgetting between, but not within, dissociative personality states. *Journal of Abnormal Psychology*, 112(2), 237–243.
- Frankel, A. S., & Dalenberg, C. (2006). The forensic evaluation of dissociation and persons diagnosed with dissociative identity disorder: Searching for convergence. *Psychiatric Clinics of North America*, 29(1), 169–184 (Review).
- Fraser, G. A. (2005). Re: The persistence of folly: A critical examination of dissociative identity disorder. *Canadian Journal of Psychiatry*, 50(12), 814 (Comment).
- Friston, K. J., Price, C. J., Buechel, C., & Frackowiak, R. S. J. (1997). A taxonomy of study design. <http://www.fil.ion.ucl.ac.uk/spm/course/notes97/Ch7.pdf>, pp. 1–22.

- Geraerts, E. (2006). *Remembrance of things Past: The cognitive psychology of remembering and forgetting trauma*. PhD thesis, University of Maastricht.
- Geraerts, E., Smeets, E., Jelicic, M., van Heerden, J., & Merckelbach, H. (2005). Fantasy proneness, but not self-reported trauma is related to DRM performance of women reporting recovered memories of childhood sexual abuse. *Consciousness and Cognition*, 14(3), 602–612.
- Gleaves, D. H. (1996). The sociocognitive model of dissociative identity disorder: A reexamination of the evidence. *Psychological Bulletin*, 120(1), 42–59 (Review).
- Gleaves, D. H., May, M. C., & Cardena, E. (2001). An examination of the diagnostic validity of dissociative identity disorder. *Psychological Bulletin*, 121(4), 577–608 (Review).
- Haynes, J. D., & Rees, G. (2006). Decoding mental states from brain activity in humans. *Nature Reviews Neuroscience*, 7(7), 523–534.
- Hughes, J. R., Kuhlman, D. T., Fichtner, C. G., & Gruenfeld, M. J. (1990). Brain mapping in a case of multiple personality. *Clinical Electroencephalography*, 21(4), 200–209.
- Huntjens, R. J. C. (2003). *Apparent amnesia: Interidentity memory functioning in dissociative identity disorder*. PhD thesis, University of Utrecht.
- Huntjens, R. J., Postma, A., Hamaker, E. L., Woertman, L., van der Hart, O., & Peters, M. (2002). Perceptual and conceptual priming in patients with dissociative identity disorder. *Memory & Cognition*, 30(7), 1033–1043.
- Huntjens, R. J., Postma, A., Peters, M. L., Woertman, L., & van der Hart, O. (2003). Interidentity amnesia for neutral, episodic information in dissociative identity disorder. *Journal of Abnormal Psychology*, 112(2), 290–297.
- Huntjens, R. J., Peters, M. L., Postma, A., Woertman, L., Efting, M., & van der Hart, O. (2005a). Transfer of newly acquired stimulus valence between identities in dissociative identity disorder (DID). *Behaviour Research and Therapy*, 43(2), 243–255.
- Huntjens, R. J., Postma, A., Woertman, L., van der Hart, O., & Peters, M. L. (2005b). Procedural memory in dissociative identity disorder: When can inter-identity amnesia be truly established? *Consciousness and Cognition*, 14(2), 377–389.
- Huntjens, R. J., Peters, M. L., Woertman, L., Bovenschen, L. M., Martin, R. C., & Postma, A. (2006). Inter-identity amnesia in dissociative identity disorder: A simulated memory impairment? *Psychological Medicine*, 36(6), 857–863.
- Kozel, F. A., Johnson, K. A., Mu, Q., Grenesko, E. L., Laken, S. J., & George, M. S. (2005). Detecting deception using functional magnetic resonance imaging. *Biological Psychiatry*, 58(8), 605–613.
- Kulynych, J. (1996). Brain, mind, and criminal behavior: Neuroimages as scientific evidence. *Jurometrics Journal*, 36(3), 235–244.
- Laconte, S. M., Peltier, S. J., & Hu, X. P. (2007). Real-time fMRI using brain-state classification. *Human Brain Mapping*, 28(10), 1033–1044.
- Laney, C., & Loftus, E. F. (2005). Traumatic memories are not necessarily accurate memories. *Canadian Journal of Psychiatry*, 50(13), 823–828 (Review).
- Langbein, D. D., Loughhead, J. W., Bilker, W. B., Ruparel, K., Childress, A. R., Busch, S. I., & Gur, R. C. (2005). Telling truth from lie in individual subjects with fast event-related fMRI. *Human Brain Mapping*, 26(4), 262–272.
- Lapointe, A. R., Crayton, J. W., DeVito, R., Fichtner, C. G., & Konopka, L. M. (2006). Similar or disparate brain patterns? The intra-personal EEG variability of three women with multiple personality disorder. *Clinical EEG and Neuroscience*, 37(3), 235–242.
- Mathew, R. J., Jack, R. A., & West, W. S. (1985). Regional cerebral blood flow in a patient with multiple personality. *American Journal of Psychiatry*, 142(4), 504–505.
- McElroy, L. P. (1992). Early indicators of pathological dissociation in sexually abused children. *Child Abuse & Neglect*, 16, 833–846.
- Merckelbach, H., & Muris, P. (2001). The causal link between self-reported trauma and dissociation: A critical review. *Behaviour Research and Therapy*, 39, 245–254 (Review).
- Merckelbach, H., Horselenberg, R., & Muris, P. (2001). The creative experiences questionnaire (CEQ): A brief self-report measure of fantasy proneness. *Personality and Individual Differences*, 31, 987–995.
- Merckelbach, H., Devilly, G. J., & Rassin, E. (2002). Alters in dissociative identity disorder. Metaphors or genuine entities? *Clinical Psychology Review*, 22(4), 481–497 (Review).
- Merckelbach, H., Smeets, T., Geraerts, E., Jelicic, M., Bouwen, A., & Smeets, E. (2006). I haven't thought about this for years! Dating recent recalls of vivid memories. *Applied Cognitive Psychology*, 20, 33–42.
- Mesulam, M. M. (1981). Dissociative states with abnormal temporal lobe EEG: Multiple personality and the illusion of possession. *Archives of Neurology*, 38(3), 176–181.
- Mohamed, F. B., Faro, S. H., Gordon, N. J., Platek, S. M., Ahmad, H., & Williams, J. M. (2006). Brain mapping of deception and truth telling about an ecologically valid situation: Functional MR imaging and polygraph investigation-initial experience. *Radiology*, 238(2), 679–688.
- Moritz, S., Glascher, J., Sommer, T., Büchel, C., & Braus, D. F. (2006). Neural correlates of memory confidence. *NeuroImage*, 33(4), 1188–1193.
- Nijenhuis, E. R. S., Spinhoven, P., van Dyck, R., van der Hart, O., & Vanderlinden, J. (1998). Degree of somatoform and psychological dissociation in dissociative disorder is correlated with reported trauma. *Journal of Traumatic Stress*, 11(2), 711–730.
- Nijenhuis, E. R. S., van der Hart, O., & Steele, K. (2002). The emerging psychobiology of trauma-related dissociation and dissociative disorders. In H. A. H. D'haenen, J. A. Den Boer, & P. Willner (Eds.), *Biological psychiatry* (vol. 2, pp. 1079–1098). Chichester, UK: Wiley & Sons Ltd.
- Patel, P., Meltzer, C. C., Mayberg, H. S., & Levine, K. (2007). The role of imaging in United States courtrooms. *Neuroimaging Clinics of North America*, 17(4), 557–567.
- Piper, A., & Merskey, H. (2004a). The persistence of folly: A critical examination of dissociative identity

- disorder. Part I. The excesses of an improbable concept. *Canadian Journal of Psychiatry*, 49(9), 592–600 (Review).
- Piper, A., & Merskey, H. (2004b). The persistence of folly: Critical examination of dissociative identity disorder. Part II. The defence and decline of multiple personality or dissociative identity disorder. *Canadian Journal of Psychiatry*, 49(10), 678–683 (Review).
- Piper, A., & Merskey, H. (2005). The persistence of folly: A critical examination of dissociative identity disorder. *Canadian Journal of Psychiatry*, 50(12), 814 (Comment).
- Pope, H. G., Barry, S., Bodkin, A., & Hudson, J. I. (2006). Tracking scientific interest in the dissociative disorders: A study of scientific publication output 1984–2003. *Psychotherapy and Psychosomatics*, 75, 19–24.
- Price, C. J., Moore, C. J., & Friston, K. J. (1997). Subtractions, conjunctions, and interactions in experimental design of activation studies. *Human Brain Mapping*, 5(4), 264–272.
- Reinders, A. A. T. S. (2004). Psycho-biological characteristics of dissociative identity disorder: rCBF, physiologic, and subjective findings from a symptom provocation study. In *From methods to meaning in functional neuroimaging* (pp. 63–93). University Library Groningen, Groningen. PhD thesis.
- Reinders, A. A. T. S., Nijenhuis, E. R. S., Paans, A. M. J., Korf, J., Willemsen, A. T. M., & den Boer, J. A. (2003). One brain, two selves. *NeuroImage*, 20(4), 2119–2125.
- Reinders, A. A. T. S., Nijenhuis, E. R. S., Quak, J., Korf, J., Haaksma, J., Paans, A. M. J., Willemsen, A. T. M., & den Boer, J. A. (2006). Psychobiological characteristics of dissociative identity disorder: A symptom provocation study. *Biological Psychiatry*, 60(7), 730–740.
- Rieber, R. W. (1999). Hypnosis, false memory and multiple personality: A trinity of affinity. *History of Psychiatry*, 10(37), 3–11.
- Rogers, R. (1997). *Clinical assessment of malingering and deception* (2nd ed.). New York: Guilford Press.
- Ross, C. A., Norton, G. R., & Wozney, K. (1989). Multiple personality disorder: An analysis of 236 cases. *Canadian Journal of Psychiatry*, 34(5), 413–418.
- Sar, V. (2005). Re: The persistence of folly: A critical examination of dissociative identity disorder. What are Dr Piper and Dr Merskey trying to do? *Canadian Journal of Psychiatry*, 50(12), 813 (Comment).
- Sar, V., Unal, S. N., Kiziltan, E., Kundaci, T., & Ozturk, E. (2001). HMPAO SPECT study of regional cerebral blood flow in dissociative identity disorder. *Journal of Trauma & Dissociation*, 2(2), 5–25.
- Sar, V., & Akyuzi, G. Dogan, O. (2007a). Prevalence of dissociative disorders among women in the general population. *Psychiatry Research*, 149(1–3) 169–76.
- Sar, V., Unal, S. N., & Ozturk, E. (2007b). Frontal and occipital perfusion changes in dissociative identity disorder. *Psychiatry Research: Neuroimaging*, 156(3), 217–223.
- Saxe, G. N., Vasile, R. G., Hill, T. C., Bloomingdale, K., & Van der Kolk, B. A. (1992). SPECT imaging and multiple personality disorder. *The Journal of Nervous and Mental Disease*, 180(10), 662–663.
- Schreiber, F. (1973). *Sybil*. New York: Warner Communications.
- Sheehan, W., Thurber, S., & Sewall, B. (2006). Dissociative identity disorder and temporal lobe involvement: Replication and a cautionary note. *The Royal Australian and New Zealand College of Psychiatrists*, 40(4), 374–375.
- Smeets, T., Jelicic, M., & Merckelbach, H. (2006). Reduced hippocampal and amygdalar volume in dissociative identity disorder: Not such clear evidence. *American Journal of Psychiatry*, 163(9), 1643 (Comment).
- Spanos, N. P. (1994). Multiple identity enactments and multiple personality disorder: A sociocognitive perspective. *Psychological Bulletin*, 116(1), 143–165 (Review).
- Steele, K., van der Hart, O., & Nijenhuis, E. (2001). Dependency in the treatment of complex posttraumatic stress disorder and dissociative disorders. *Journal of Trauma & Dissociation*, 2(4), 79–116.
- Steinberg, M. (1993). *Structured clinical interview for DSM-IV dissociative disorders (SCID-D)*. Washington, DC: American Psychiatric Press.
- Stern, C. E., Corkin, S., Gonzalez, R. G., Guimaraes, A. R., Baker, J. R., Jennings, P. J., Carr, C. A., Sugiura, R. M., Vedantham, V., & Rosen, B. R. (1996). The hippocampal formation participates in novel picture encoding: Evidence from functional magnetic resonance imaging. *Proceedings of the National Academy of Sciences of the USA*, 93, 8860–8865.
- Stickley, T., & Nickeas, R. (2006). Becoming one person: Living with dissociative identity disorder. *Journal of Psychiatric and Mental Health Nursing*, 13(2), 180–187 (Review).
- Talairach, J., & Tournoux, P. (1988). *Co-planar stereotaxic atlas of the human brain*. Stuttgart: Thieme Verlag.
- Tsai, G. E., Condie, D., Wu, M. T., & Chang, I. W. (1999). Functional magnetic resonance imaging of personality switches in a woman with dissociative identity disorder. *Harvard Review of Psychiatry*, 7(2), 119–122.
- Van der Kolk, B. A., & Fisler, R. (1995). Dissociation and the fragmentary nature of traumatic memories: Overview and exploratory study. *Journal of Traumatic Stress*, 8, 505–525.
- Vermetten, E. (2006). Reduced hippocampal and amygdalar volume in dissociative identity disorder: Not such clear evidence. *American Journal of Psychiatry*, 163(9), 1643–1644 (Reply).
- Vermetten, E., Schmahl, C., Lindner, S., Loewenstein, R. J., & Bremner, J. D. (2006). Hippocampal and amygdalar volumes in dissociative identity disorder. *American Journal of Psychiatry*, 163(4), 630–636.
- Xiao, Z., Yan, H., Wang, Z., Zou, Z., Xu, Y., Chen, J., Zhang, H., Ross, C. A., & Keyes, B. B. (2006). Trauma and dissociation in China. *American Journal of Psychiatry*, 163(8), 1388–1391.
- Zlotnick, C., Shea, M. T., Pearlstein, T., Begin, A., Simpson, E., & Costello, E. (1996). Differences in dissociative experiences between survivors of childhood incest and survivors of assault in adulthood. *The Journal of Nervous and Mental Disease*, 184(1), 52–54.