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Review article

Hypnotic suggestibility in dissociative and related disorders: A meta-analysis

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ABSTRACT

Elevated responsiveness to verbal suggestions is hypothesized to represent a predisposing factor for the dissociative disorders (DDs) and related conditions. However, the magnitude of this effect has not been estimated in these populations nor has the potential moderating influence of methodological limitations on effect size variability across studies. This study assessed whether patients with DDs, trauma- and stressor-related disorders (TSDs), and functional neurological disorder (FND) display elevated hypnotic suggestibility. A systematic literature search identified 20 datasets. A random-effects meta-analysis revealed that patients displayed greater hypnotic suggestibility than controls, Hedges's $g = 0.92$ [0.66, 1.18]. This effect was observed in all subgroups but was most pronounced in the DDs. Although there was some evidence for publication bias, a bias-corrected estimate of the group effect remained significant, $g = 0.57$ [0.30, 0.85]. Moderation analyses did not yield evidence for a link between effect sizes and methodological limitations. These results demonstrate that DDs and related conditions are characterized by elevated hypnotic suggestibility and have implications for the mechanisms, risk factors, and treatment of dissociative psychopathology.

1. Introduction

The *dissociative disorders* (DDs) are characterized by pronounced disruptions in the normal integration of consciousness, memory, identity, emotion, and perception (American Psychiatric Association, 2013). They comprise three core conditions: dissociative amnesia, characterized by memory loss for oneself, events or individuals in one's life (Staniloiu and Markowitsch, 2014), depersonalization-derealization disorder, involving a sense of detachment from oneself or one's surroundings (Michal et al., 2016), and dissociative identity disorder (DID), characterized by the presence of two or more distinct identities (Dorahy et al., 2014).

The DDs share phenomenological overlap with two related conditions: trauma- and stressor-related disorders (TSDs), such as post-traumatic stress disorder (PTSD), characterized by re-experiencing symptoms (e.g., dissociative reactions such as flashbacks), avoidant behaviour, and alterations in cognition and affect (e.g., dissociative amnesia) in the wake of trauma exposure (Bryant, 2019), and functional neurological disorder (FND), which includes impaired motor or cognitive functioning that resembles neurological pathology but is not adequately explained by it (American Psychiatric Association, 2013; Espay et al., 2018). TSDs and FND are both characterized by pronounced dissociative symptomatology (Lyssenko et al., 2018) with considerable comorbidity across conditions (Akyüz et al., 2017; Butler et al., 2021; Lebois et al., 2020; Rodewald et al., 2011; Swart et al., 2020). For example, a recent study reported that all patients with dissociative identity disorder (DID) had a comorbid diagnosis of the dissociative subtype of PTSD (Lebois et al., 2020). This phenomenological and symptomatological overlap has culminated in the inclusion of a dissociative subtype of PTSD in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013; Lanius et al., 2010; Wolf et al., 2012). Although the dissociative subtype of PTSD is characterised by marked depersonalisation/derealisation, posttraumatic symptoms are related to other forms of dissociation as

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well (Cardeña et al., 2021; Ross, 2021; Ross et al., 2018). Similarly, FND is classified as a DD in the International Classification of Diseases (ICD-11; World Health Organization, 2018) whereas dissociative symptoms (e.g., dissociative amnesia) are often framed as functional symptoms (e.g., functional cognitive disorder) (McWhirter et al., 2020).

DDs have a prevalence of ~10% 18% in the general population and in clinical settings (Foote et al., 2006; Kate et al., 2020; Sar, 2011; Sar et al., 2007) whereas the prevalence of PTSD ranges from 6% to 20% (Breslau et al., 1991; Kessler et al., 1995). FND, on the other hand, has a lower prevalence of 4–12 per 100,000 (Benbadis and Allen Hauser, 2000; Carson et al., 2012) and is observed in ~16% of neurology outpatients (Stone et al., 2010). Exposure to stressful life events is widely recognized as the primary antecedent of DDs and TSDs (American Psychiatric Association, 2013; Classen et al., 1993). By contrast, although FND is associated with greater trauma exposure, it does not represent a core feature of this condition (Keynejad et al., 2019; Ludwig et al., 2018; Roelofs et al., 2002a, 2002b).

Aside from trauma exposure, the psychological factors underlying the development of these conditions remain poorly understood. In part shaped by historical links between dissociative conditions and hypnosis (Deeley, 2016a; Ellenberger, 1970; Frankel, 1990; Janet, 1907; Mertens and Vermetten, 2018), a longstanding hypothesis is that high hypnotic suggestibility confers risk to dissociative psychopathology in response to trauma (diathesis stress model; Bliss, 1983; Frischholz et al., 1992; Spiegel et al., 1988; Wieder and Terhune, 2019)(see also Keynejad et al., 2019). Hypnotic suggestibility, as assessed by standardized behavioural scales (Acunzo and Terhune, 2021; Woody and Barnier, 2008), refers to a stable capacity to experience involuntary responses to direct verbal suggestions in the context of hypnosis (e.g., analgesia: "you will not feel anything at all in your arm."; (Oakley et al., 2021; Polczyk, 2016)). Responses to suggestions among highly suggestible individuals are characterized by a pronounced reduction in the experience of authorship over one's actions and experience (Polito et al., 2014; Weitzenhoffer, 1974) and bear close phenomenological resemblance to distortions in the sense of agency in clinical populations (Polito et al., 2015).

Despite the perennial link between hypnotic suggestion and dissociation, an ongoing controversy concerns the role of suggestibility in the aetiology of the DDs (Dalenberg et al., 2012; Lynn et al., 2019). In particular, there has been recent debate between researchers who attribute DDs to trauma exposure (Dalenberg et al., 2012), and those maintaining that dissociative symptoms and trauma memories are induced and shaped by suggestibility, iatrogoenesis, and false memories (Lynn et al., 2014, 2019). This debate has largely neglected the hypothesis that high hypnotic suggestibility functions as a *risk factor* for DDs and related conditions (Butler et al., 1996) in favour of conceiving suggestibility as a causal variable that *produces* dissociative symptoms (Lynn et al., 2014). In turn, these debates have not considered potential evidence for elevated suggestibility in DDs from measures of direct verbal (hypnotic) suggestibility, instead focusing on indices closely related to compliance (e.g., interrogative suggestibility) (Gudjonsson, 2013), which are distinct from direct verbal suggestibility (Polczyk, 2016) and arguably less relevant to treatment (Poole et al., 2010), differential diagnosis (e.g., suggestive symptom induction; Popkirov et al., 2015), and underlying mechanisms (e.g., Brown and Reuber, 2016).

The present meta-analysis sought to integrate and quantitatively synthesize data pertaining to hypnotic suggestibility in dissociative (DDs), trauma- and stressor-related (TSDs) and functional neurological disorders (FND). A recent meta-analysis (Wieder et al., 2021) demonstrated that FND patients display markedly greater direct verbal suggestibility relative to controls, with moderate-to-large effect sizes, on both standardized scales of (hypnotic) suggestibility and in response to suggestive symptom induction protocols. However, to our knowledge, hypnotic suggestibility data in DDs and TSDs have not yet been quantitatively integrated and it remains unknown whether these conditions and FND are characterized by differential levels of hypnotic suggestibility. Clarifying any similarities and differences in hypnotic suggestibility has implications for the extent to which these conditions share overlapping mechanisms, can be subsumed within a broader category (e.g., dissociative disorders), and the viability of suggestion-based therapeutic interventions in the treatment of these conditions (e.g., Deeley, 2016b). In addition, it remains unclear whether evidence for elevated suggestibility in these populations is artefactual of methodological confounds such as experimenter unmasking (Holman et al., 2015). Toward this end, we integrated controlled studies of patients with DDs, TSDs, and FND in order to quantify the evidence for elevated hypnotic suggestibility in these conditions using random effects meta-analyses. Secondary analyses contrasted patient-control differences between patient subgroups and assessed the evidence for potential moderating variables.

2. Method

2.1. Eligibility criteria

Inclusion criteria included: (1) English language; (2) full paper in a peer-reviewed journal; (3) patient sample including DDs (dissociative identity disorder [formerly multiple personality disorder], dissociative disorder not otherwise specified, dissociative amnesia, and/or depersonalisation disorder), TSDs (post-traumatic stress disorder or acute stress disorder) and FND; (4) inclusion of a control group; and (5) use of a standardized behavioural scale of direct verbal suggestibility (Terhune et al., 2017). In order to ensure a representative sample of studies, we adopted a broad definitional approach to diagnostic categories and included studies that used DSM-III (American Psychiatric Association, 1980, 1987) and DSM-IV (American Psychiatric Association, 1994), medical investigations, and/or case note reviews (see Table 1). Exclusion criteria included: (1) non-empirical papers or case studies/series; (2) failure to report hypnotic suggestibility descriptive statistics for patient and control groups; (3) overlapping data; and (4) use of interrogative suggestibility scales, which assess a form of suggestibility characterized by high compliance that tends to only weakly correlate with direct verbal suggestibility (Polczyk, 2016).

2.2. Search strategy

We searched the following databases in November 2019 for eligible studies: PubMed, PsycINFO, Web of Science, and Academic Search Complete using terms relating to suggestibility, dissociation and trauma (see Supplemental material). We integrated all eligible studies into a single database and manually searched their reference lists (and review papers) to identify additional studies. We repeated the search in November 2021, including the search for FND-specific studies (Wieder et al., 2021); these searches yielded no new studies.

2.3. Study selection

All studies were independently screened and assessed by two raters (LW and a second rater) for eligibility using a two-stage procedure. First, the raters screened all titles and abstracts; any articles that did not meet eligibility criteria were rejected. The raters then reviewed all the remaining papers to establish a final list of studies. At either stage, a third reviewer (DBT) and sometimes a fourth reviewer (RJB) were consulted to resolve any discrepancies.

2.4. Data extraction

Direct verbal suggestibility was assessed using continuous measures. Four studies with overlapping data were excluded. The raters independently extracted and coded the data from eligible studies using a data extraction form that included: (i) study details (title, year, geographical location), (ii) diagnosis, (iii) diagnosis method, (iv) demographics

Table 1
Characteristics of included studies measuring hypnotic suggestibility as a function of psychiatric subgroup.

Source	Diagnostic criteria and procedurewe	Patients			Controls			Hypnotic suggestibility scale	Experimenter blindness
		Diagnosis*	*n* (% female)	Age [*M* (SD)]	Diagnosis	*n* (% female)	Age [*M* (SD)]		
Dissociative disorders (DD)									
Dale et al. (2009)a	DSM-IV, CR	DID	13 (-)	38 (-)	NCC	14 (-)	29.3 (-)	HGSHS:A	No
Dale et al. (2009)b	DSM-IV, CR	mDD [DA: 70%; DDD: 30%]	10 (-)	33.7 (-)	NCC	14 (-)	29.3 (-)	HGSHS:A	No
Ebrinc et al. (2008)	DSM-IV, CR	mDD [DID: 82%, DDNOS: 18%]	50 (18)	23.2 (5.3)	MD	50 (22)	23.5 (4.6)	HIP-ERS	Yes
Welburn et al. (2003)	DSM-IV, CR	DID	12 (75)	42 (6.4)	NCC	9 (100)	33 (6.9)	HIP-ERS	Yes
Frischholz et al. (1992)	DSM-III-(R)	mDD [MPD: 71%, DDNOS: 29%]	17 (100)	35.1 (9.7)	NCC	63 (40)	20.9 (3.7)	SHSS:C	Yes
Bliss and Larson (1985)	DSM-III, CR	MPD	7 (-)	- (-)	NCC	49 (-)	- (-)	SHSS:C	Yes
Bliss (1983)b	–	MPD	6 (-)	- (-)	NCC	49 (-)	- (-)	SHSS:C	Yes
Bliss (1983)a	–	MPD	28 (-)	- (-)	NCC	49 (-)	- (-)	SHSS:C	–
Trauma- and stressor-related disorders (TSD)									
Bryant et al. (2001)	CR	ASD	23 (44)	31.91 (12.17)	TP	20 (40)	32.7 (10.55)	SHCS	Yes
Spiegel et al. (1988)	DSM-III	PTSD	65 (-)	34.9 (4)	NCC	83 (-)	28.1 (8.8)	HIP	–
Stutman and Bliss (1985)	DSM-III, CR	PTSD	14 (-)	- (-)	NCC	12 (-)	- (-)	SHSS:C	Yes
Functional neurological disorder (FND)									
Khan et al., (2009)	MI	NES	24 (-)	- (-)	ES	16 (-)	- (-)	HIP	–
Roelofs et al. (2002a), (2002b)	DSM-IV, MI, CR	mCD	50 (84)	37.2 (11.9)	mAD	50 (82)	36.4 (11.1)	SHSS:C	Yes
Litwin and Cardeña, 2001	MI	NES	10 (100)	30.5 (9.9)	ES	31 (45)	35.2 (8.9)	SHCS	Yes
Moene et al. (2001)/ Spinhoven et al. (1991)**	DSM-III-R, CR	mCD	96 (-)	- (-)	NCC	82 (57)	- (-)	SHCS	–
Barry et al. (2000)	MI, CR	NES/ES	36 (-)	- (-)	ES	22 (-)	- (-)	HIP	No
Kuyk et al. (1999)	MI	NES	20 (80)	25 (-)	ES	17 (18)	37 (-)	SHCS	Yes
Kuyk et al. (1995a), (1995b)	MI, CR	NES	6 (50)	19.3 (-)	ES	7 (14)	28.6 (-)	SHCS	Yes
Bliss, (1984)a	CR	mCD	18 (100)	- (-)	NCC	49 (-)	- (-)	SHSS:C	–
Bliss, (1984)b	CR	BS	17 (100)	- (-)	NCC	49 (-)	- (-)	SHSS:C	–

Note. FND data are reproduced from Wieder et al. (2021). ASD=acute stress disorder; BS=Briquet's syndrome; CR=case note review; DA=dissociative amnesia; DDD=depersonalization-derealization disorder; DDNOS=dissociative disorder not otherwise specified; DID=dissociative identity disorder (formerly multiple personality disorder); DSM=Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association); ES=epileptic seizures; HGSHS:A = Harvard Group Scale of Hypnotic Susceptibility: Form A; HIP = Hypnotic Induction Profile; HIP-ERS = Hypnotic Induction Profile – Eye roll sign; mAD=mixed affective disorders; mCD=mixed conversion disorder; mDD=mixed dissociative disorder; MD=major depression; MI=medical investigation; MPD=multiple personality disorder; NCC=non-clinical controls; NES=non-epileptic seizures; PTSD=post-traumatic stress disorder; SHCS = Stanford Hypnotic Clinical Scale; SHSS:C = Stanford Hypnotic Susceptibility Scale: Form C; TP=trauma patients; a, b = different subsamples within a single study or paper. * = Original diagnostic category names are used; - = Not reported; ** = Control data were drawn from Spinhoven et al. (1991).

(gender, sample size and age distributions), (v) study design details (scale, administration method [live or recorded presentation], scoring method [self or experimenter], inclusion of a hypnotic induction, and experimenter blindness [blind, unblind, or unreported]), (vi) descriptive statistics (*M*s and *SD*s), and (vii) inclusion of a self-report measure of dissociation (and corresponding descriptive statistics). The two raters had 93% agreement, and a third reviewer (DBT) resolved discrepancies. Only studies that used hypnotic suggestibility scales were identified and thus the meta-analysis does not include any non-hypnotic suggestibility studies. Similarly, insofar as no study reported a corrected measure for compliance, only behavioural scales were included in the analyses. Only one study (Frischholz et al., 1992) reported data for two scales (Hypnotic Induction Profile [Spiegel and Spiegel, 1978]; Stanford Hypnotic Susceptibility Scale: Form C (SHSS:C; Weitzenhoffer and Hilgard, 1962)); we included only data from the SHSS:C, which is more commonly used (Acunzo and Terhune, 2021; Barnier and McConkey, 2004; Woody and Barnier, 2008). Three studies (Bliss, 1983; Bliss and Larson, 1985; Dale et al., 2009) used the same control groups for comparisons with different patient samples. We further incorporated data from a recent meta-analysis of suggestibility in FND (Wieder et al., 2021) that was coded in the same manner; in order to allow suitable comparison, we only included hypnotic suggestibility studies from this meta-analysis.

2.5. Study quality

We assessed study quality using a 12-item scale drawn from a recent meta-analysis (Wieder et al., 2021; see Supplemental material). The scale items were adapted from a previous meta-analysis, with items based on Cochrane criteria and PRISMA recommendations (Thompson et al., 2019) as well as a range of other methodological criteria. Each item was independently rated by the raters using a categorical measure (0 =criterion not met, 1 =criterion met), and a summed total was computed for each study. There was 90% (kappa=0.82) agreement between raters, and DBT helped resolve discrepancies.

2.6. Meta-analysis and meta-regression

All analyses were performed using Review Manager (v. 5.3, 2014; The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen) and JASP (v. 0.8.6, 2019; JASP Team, Netherlands). Individual study effect sizes included between-group differences in hypnotic suggestibility (standardised mean differences [*SMD*s]; Hedges's *g*s, including the small sample bias correction) with positive values reflecting greater

responsiveness in patients than controls. We performed random-effects meta-analyses on *SMD*s and used studentized residuals (>|3.3|) (Viechtbauer and Cheung, 2010) for outlier detection but found no outliers in the total sample or in analyses of patient subgroups (maximum studentized residuals: total sample ($k = 20$): |2.34|); DD ($k = 8$): |2.20|;

DID ($k = 5$): |0.92|; mDD ($k = 3$): |2.68|; TSD ($k = 3$): |3.06|; FND ($k = 9$): |2.34|). For analyses with $k > =5$, we supplemented *SMD*s and 95% CIs with 95% prediction intervals (PIs) following Riley and colleagues (Riley et al., 2011) (see also Higgins et al., 2009; IntHout et al., 2016). PIs provide information regarding the distribution of the respective effect, can be used to estimate the likely effect in a future individual study with similar characteristics, and can be especially valuable in aiding interpretation of clinical heterogeneity (Riley et al., 2011; Siemens et al., 2021). We assessed publication bias by examining funnel plots of effect sizes against standard errors for asymmetry and used the Egger's bias test (Egger et al., 1997) for which $p < .05$ is indicative of asymmetry. Revised effect sizes correcting for asymmetry were computed using the trim-and-fill method (Duval and Tweedie, 2000). Effect size moderators were assessed using meta-regression analyses whenever data were available for at least two studies at each level of a categorical moderator and at least 10 studies for continuous moderators (Higgins and Green, 2008). Moderators included four categorical measures (disorder, experimenter blindness, scale type [direct vs. eye-roll], and control group type [non-clinical vs. clinical]) and one continuous measure (methodological quality). When information pertaining to a criterion was not presented (e.g., experimenter blindness), we conservatively assumed that the criterion was not met (e.g., unmasked experimenter).

3. Results

3.1. Study inclusion

A PRISMA diagram showing study selection is presented in Fig. 1. Principal features of these studies, including diagnostic criteria and procedures, are presented in Table 1.

3.2. 3.2. Study and participant characteristics

The 17 papers included 20 studies comprising eight DD studies (patients: $n = 143$, controls: $n = 297$), three TSD studies (patients: $n = 102$, controls: $n = 115$), and nine FND studies (patients: $n = 277$, controls: $n = 323$). Studies were published between 1983 and 2009 and were conducted in the USA ($k = 11$), Netherlands ($k = 4$), Norway ($k = 2$), Australia ($k = 1$), Canada ($k = 1$) and Turkey ($k = 1$). Details regarding the demographics of patient and control samples in the included studies can be found in Table 1. All studies used standardized measures of hypnotic suggestibility including 18 with a formal hypnotic induction (Woody and Barnier, 2008) and two using the eye-roll technique (Spiegel and Spiegel, 1978).

3.3. 3.3. Methodological quality criteria

Ratings for each study on the 12 validity criteria items are shown in the Supplemental material. Although some of the study criteria were well met, several were not. Only 13 of 20 studies (65%) described the diagnosis procedure and criteria in adequate detail, 12 (60%) described the inclusion/exclusion criteria, 11 (55%) reported experimenter blindness, eight (40%) described the scale and procedure for

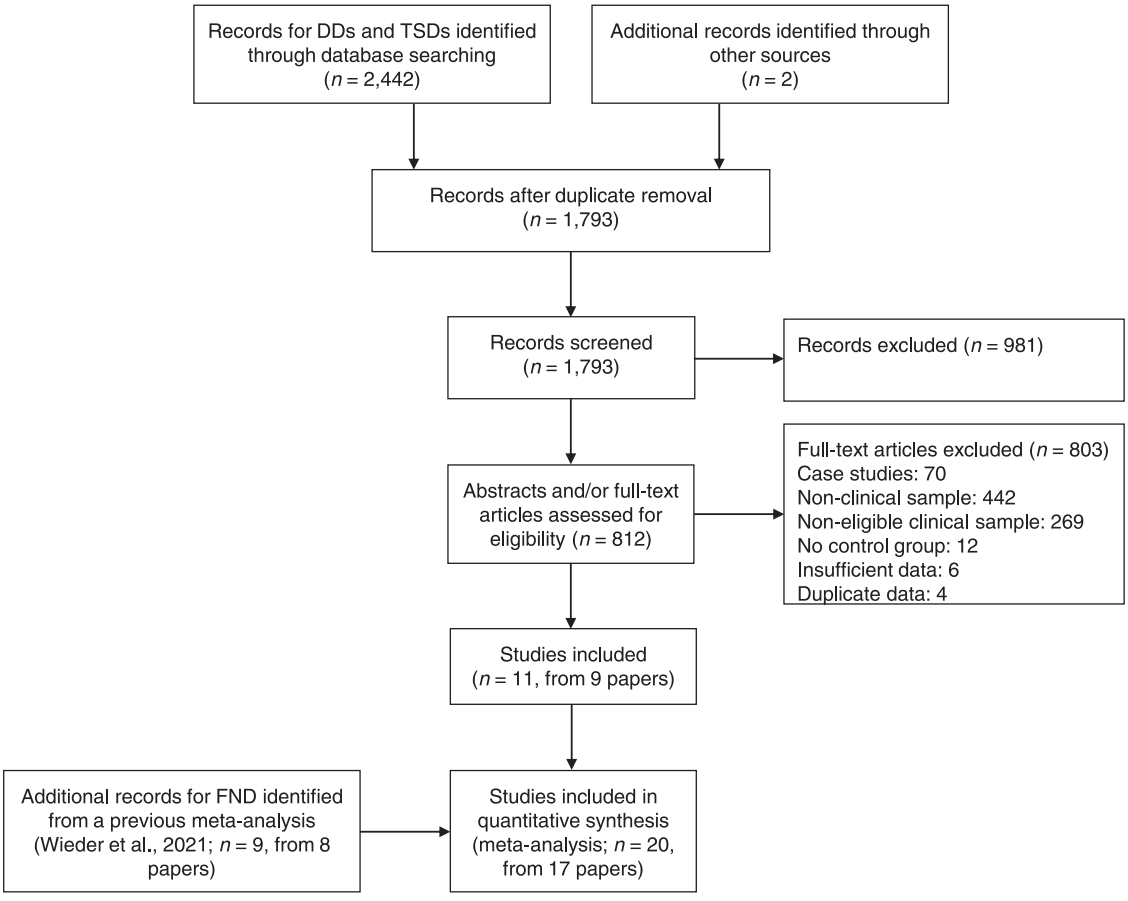

Fig. 1. PRISMA flowchart of study selection process for Dissociative Disorders (DDs), Trauma and Stressor-related Disorders (TSD) and Functional Neurological Disorder (FND).

suggestibility scale administration, eight (40%) described the participant characteristics but only three (15%) included demographically-comparable control samples. Although 18 (90%) of the studies used robust hypnotic suggestibility scales that included a standardized induction and set of verbal suggestions with formal response criteria for assessing responsiveness (Woody and Barnier, 2008), no studies (0%) included a measure to correct hypnotic suggestibility scores for compliance.

3.4. Random-effects meta-analyses

3.4.1. All patient subgroups

The meta-analysis of all 20 studies collapsing across disorders indicated that patients displayed greater hypnotic suggestibility than controls, *SMD* = 0.92 [95% CI: 0.66, 1.18], $Z = 6.95$, $p < .001$, *PI* = [− 0.15, 1.99] (see Fig. 2), albeit with considerable heterogeneity in effect sizes, $I^2 = 74\%$, $\tau^2 = .24$. A Jackknife analysis in which individual studies were serially omitted followed by re-analysis corroborated the overall effect and demonstrated that it was not driven by specific studies as *SMD*s varied from 0.86 to 0 .98.

3.4.2. Dissociative disorders (DDs)

Meta-analysis of the eight DD studies yielded *SMD* = 1.25 [0.97, 1.52], $Z = 8.79$, $p < .001$, *PI* = [0.65, 1.85], with low heterogeneity, $I^2 = 24\%$, $\tau^2 = .04$ (see Fig. 2). A Jackknife analysis again revealed that this effect was not driven by any individual study (*SMD* range: 1.12–1.34). Among these, the five DID studies found that patients exhibited greater hypnotic suggestibility than controls, *SMD* = 1.28 [0.94, 1.61], $Z = 7.49$, $p < .001$, *PI* = [0.72, 1.84]. Positive results were observed in all DID studies with a high consistency of effect sizes and no evidence for heterogeneity, $I^2 = 0\%$, $\tau^2 = .00$ (Jackknife *SMD* range: 1.15–1.33). Similarly, the three mixed (mDD) studies also found that patients exhibited greater hypnotic suggestibility than controls, with a comparable effect size, *SMD* = 1.16 [0.50, 1.82], $Z = 3.45$, $p < .001$. Positive results were observed in all three studies albeit with inconsistent effect sizes, $I^2 = 72\%$, $\tau^2 = .24$ (Jackknife *SMD* range: 0.83–1.31).

3.4.3. Trauma and stressor-related disorders (TSDs)

Meta-analysis of the three TSD studies found that patients exhibited greater hypnotic suggestibility than controls, with a comparable effect size to that in the DD studies, *SMD* = 1.17 [0.14, 2.19], $Z = 2.22$, $p = .027$ (see Fig. 2). Positive results were observed in all studies although there was high inconsistency of effect sizes, $I^2 = 88\%$, $\tau^2 = .70$, which was further reflected in the variability of effect sizes in a Jackknife analysis (*SMD* range: 0.56–1.70). This heterogeneity was arguably driven by a single study (Stutman and Bliss, 1985) with a large effect size whose CIs did not overlap with the CIs for the *SMD* when collapsed across subgroups. After excluding this study, the effect size for TSD studies was notably lower, albeit still statistically significant, *SMD* = 0.56 [0.05, 1.06], $Z = 2.15$, $p = .030$, with acceptable inter-study variability, $I^2 = 54\%$, $\tau^2 = .08$.

3.4.4. Functional neurological disorder (FND)

As previously reported by Wieder et al. (2021), in a sub-analysis of FND that included measures of hypnotic suggestibility, a meta-analysis of the nine FND studies found that patients exhibited greater hypnotic suggestibility than controls, *SMD* = 0.66 [0.34, 0.97], $Z = 4.05$, $p < .001$, *PI* = [−0.31, 1.63] (see Fig. 2). Positive results were observed in eight of the nine studies with relatively consistent effect sizes across studies, $I^2 = 65\%$, $\tau^2 = .14$ (Jackknife *SMD* range: 0.57–0.75).

3.4.5. Patient subgroup comparisons

The next series of analyses repeated the meta-analyses including patient subgroup as a binary moderator in order to determine whether hypnotic suggestibility differed across subgroups. Among DD studies, DID and mDD samples did not significantly differ, $z = 0.13$, $p = .90$, with a near-zero effect size difference, *SMD* = 0.04 [−0.57, 0.66], and thus subsequent comparisons collapsed across these two subgroups. The eight DD studies were characterized by significantly larger effect sizes

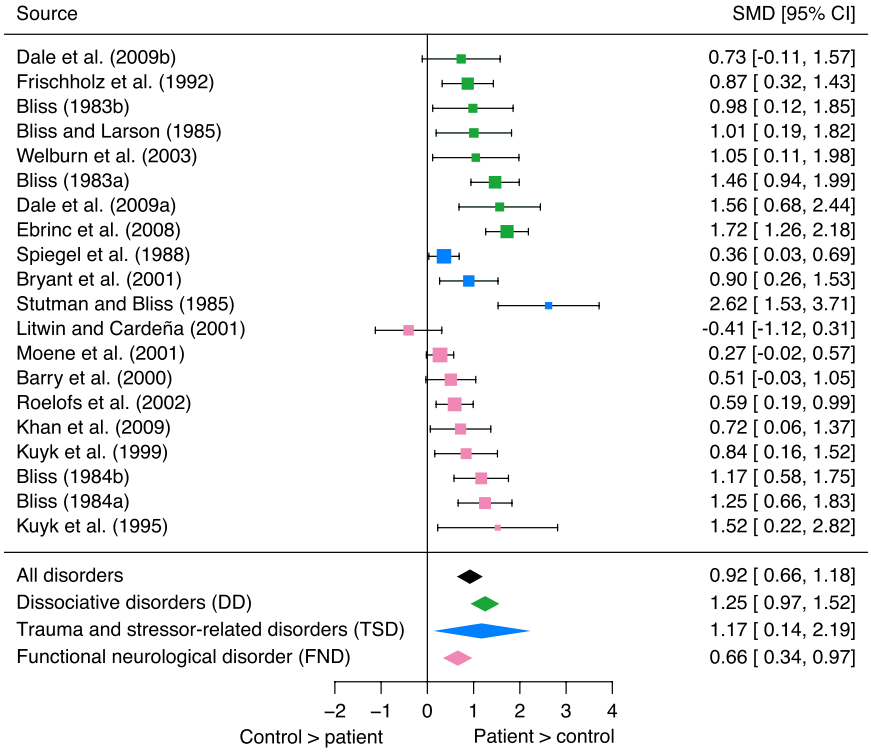

Fig. 2. Forest plot of standardised mean differences (SMDs) [95% CIs] of hypnotic suggestibility differences between patients and controls in all disorders and patient subgroups. Marker sizes reflect the study weights with smaller markers denoting smaller weights.

than the nine FND studies, $z = 2.53$, $p = .011$, corresponding to a difference of more than half an *SD*, *SMD* = 0.57 [0.13, 1.02]. By contrast, hypnotic suggestibility group effects did not differ between DD and TSD studies, $z = 0.51$, $p = .61$, *SMD* = 0.20 [−0.56, 0.95], or between TSD and FND studies, $z = 0.92$, $p = .36$, *SMD* = 0.36 [−0.41, 1.12], with modest effect sizes. However, when the potential outlying TSD study (see above) was omitted, effect sizes for the TSD studies were significantly lower than those for the DD studies, $z = 2.64$, $p = .008$, with a large effect size, *SMD* = 0.70 [0.18, 1.23], and comparable to those for the FND studies, $z = 0.11$, $p = .91$, *SMD* = 0.04 [−0.64, 0.71]. Collectively, these results demonstrate that DD is characterized by greater hypnotic suggestibility than FND, and potentially TSD, whereas TSD did not significantly differ from FND.

3.5. Publication bias

Publication bias was assessed through Egger's test and the computation of trim-and-fill estimates, for which we report changes in effect sizes (Δ*SMD*) relative to the original *SMD*s reported above. Funnel plots of effect sizes with trim-and-fill estimates are presented in Fig. 3. Across all studies, Egger's test was marginally significant, $z = 2.08$, $p = .038$, suggesting asymmetry. A trim-and-fill estimate led to a decline in the estimated difference, Δ*SMD* = −0.35, although it remained significant and moderate in size, *SMD* = 0.57 [0.30, 0.85]. Corresponding analyses in individual patient subgroups are not reported because of poor statistical power due to small study numbers (*k*s < 10). These results present evidence for publication bias in the full sample of studies. Effect size asymmetry in the full sample of studies is potentially attributable to heterogeneity of effect sizes and specifically the observed significant differences in effect sizes between DD and FND patients, which might point to important differences between these subpopulations.

3.6. Meta-regressions

Meta-analyses of patient-control differences in hypnotic suggestibility were repeated including continuous (sum of methodological quality criteria scores) and binary (individual methodological quality criteria) moderators in order to clarify to what extent effect sizes covaried with variability in methodological features across research studies (see Supplementary Materials for individual study ratings). Analyses with continuous moderators were only performed in the entire data set (*k* = 20; including all psychiatric samples) because of insufficient numbers of studies in individual patient subgroups. Analyses with binary moderators were performed whenever there were two or more studies in each binary response category (TSD studies were not analysed because of the small *k*). The latter analyses focused on experimenter blindness in order to test the prediction that effect sizes would be larger

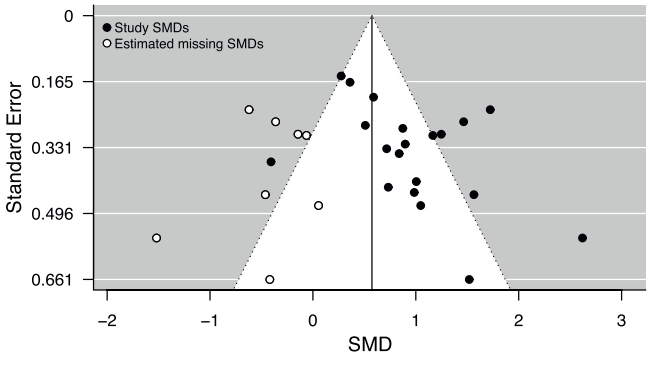

Fig. 3. Funnel plots of standardised mean differences (SMDs) in all disorders. Filled circles denote individual study SMDs and empty circles denote estimated missing individual SMDs attributable to potential publication bias imputed using the trim and fill method.

when experimenters were not blind to patient group; all other binary moderator analyses were exploratory.

Effect sizes were not significantly related to study methodological quality with near-zero effect sizes in the total sample, $z = -0.82$, $p = .41$, *SMD* = −0.05 [−0.15, 0.06]. If we restrict the analysis to the two "best practice" studies that met 11 of the 12 methodological quality criteria (Bryant et al., 2001; Roelofs et al., 2002a, 2002b), this yields a large effect size, *SMD* = 0.68 [0.34, 1.02], $z = 3.93$, $p < .001$ (Δ*SMD* = −0.24, relative to the full sample *SMD*). In contrast with our expectation that experimenter blindness would be associated with weaker effect sizes, hypnotic suggestibility group differences were numerically higher in studies that included blind experimenters relative to those with unblind experimenters (or blindness unreported) (see Table 2). Experimenter blindness did not significantly moderate effect sizes in any of the patient subgroups: all groups: *SMD* = 0.15 [−0.38, 0.67], DD: $z = 0.30$, $p = .76$, *SMD* = 0.10 [−0.54, 0.73], FND: $z = 0.62$, $p = .54$, *SMD* = 0.23 [−0.49, 0.94]. Exploratory moderation analyses were performed on effect sizes with the other individual methodological quality binary criteria, except for criteria for which all studies had uniform criterion scores (compliance correction and outcome data availability). As can be seen in Table 2, these analyses revealed that effect size differences between psychiatric patients and controls were not significantly moderated by any of these criteria. On the basis of a previous meta-analysis of suggestibility in FND (Wieder et al., 2021), which suggested that poorer methodological quality among older studies was associated with larger effect sizes, we explored whether publication year was associated with effect sizes but it was not a significant moderator, $z = -0.87$, $p = .38$, *SMD* = −0.01 [−0.04, 0.02].

When moderation analyses were performed separately in DD and FND studies, multiple significant or indicative ($.050 < p < .10$) effects were observed (see Supplementary Materials). In the DD studies, there were trends (*p*s = .073) towards larger effect sizes in studies with a clear protocol administration, Δ*SMD* = 0.38, and smaller effects when robust suggestibility measures were used, Δ*SMD* = −0.38. By contrast, among FND studies, effect sizes were significantly larger among studies that did not clearly specify inclusion/exclusion criteria, Δ*SMD* = 0.73, and diagnosis procedures, Δ*SMD* = 0.68, although effect sizes were still

Table 2
Meta-regression analyses for hypnotic suggestibility studies as a function of binary methodological quality criteria in all patient subgroups (k = 20).

Methodological quality criterion	*SMD* [CIs] (*k*)		*Z*	*p*	I^2 (%)
	No	Yes			
1: Clear study objectives	1.37 [0.98, 1.76] (2)	0.87 [0.59, 1.14] (18)	-1.23	.22	71
2: Clear sample origin	1.18 [0.60, 1.76] (2)	0.89 [0.61, 1.17] (18)	-0.68	.50	74
3: Clear sample recruitment	1.10 [0.54, 1.65] (6)	0.84 [0.55, 1.13] (14)	-0.84	.40	74
4: Clear inclusion/ exclusion criteria	1.04 [0.67, 1.41] (8)	0.85 [0.49, 1.22] (12)	-0.71	.48	75
5: Experimenter blindness	0.84 [0.50, 1.18] (9)	1.00 [0.60, 1.41] (11)	0.55	.58	73
6: Clear diagnosis procedures	0.99 [0.61, 1.36] (7)	0.90 [0.53, 1.26] (13)	-0.38	.71	75
7: Robust suggestibility scale	1.51 [0.90, 2.13] (2)	0.85 [0.60, 1.11] (18)	-1.52	.13	68
8: Clear protocol administration	1.02 [0.72, 1.33] (12)	0.77 [0.30, 1.24] (8)	-0.99	.32	74
9: Compliance correction	0.92 [0.66, 1.18] (20)	–			
10: Sample comparability	0.89 [0.61, 1.17] (17)	1.07 [0.34, 1.80] (3)	0.50	.62	74
11: Clear sample characteristics	0.96 [0.63, 1.30] (12)	0.86 [0.41, 1.31] (8)	-0.38	.71	75
12: Outcome data availability	–	0.92 [0.66, 1.18] (20)			

Notes. For precise wording of methodological quality criteria and moderation analyses in patient subgroups, see Supplementary Materials.

moderate in size and statistically significant for the studies that met these criteria, *SMD* range = 0.43–0.48 (see also Wieder et al., 2021). These results suggest that variability in the magnitude of elevated hypnotic suggestibility in DD and related conditions relative to controls is not reliably associated with the level of methodological rigour in these studies. In particular, there was no robust evidence that elevated hypnotic suggestibility in DD is potentially attributable to experimenters being aware of group status.

Our final set of moderation analyses explored whether sample characteristics would account for variability in effect sizes. An insufficient number of studies ($k = 8$) reported gender distributions for patient and control samples to permit including patient-control gender disparities as a continuous moderator. Accordingly, we contrasted four studies with approximately similar patient-control proportions of females, against four studies with imbalanced gender proportions. The former group displayed a numerically higher effect size, *SMD* = 1.07 [0.47, 1.66] vs. *SMD* = 0.63 [−0.09, 1.35], although the analysis yielded a non-significant result, $z = 0.94$, $p = .35$, *SMD* = 0.44 [−0.48, 1.36]. Similarly, among the 11 studies that reported descriptive statistics for age, patient samples tended to be slightly older, $M = 1.53$ years, $SD = 8.08$, but patient-control age discrepancy was not a significant moderator of effect sizes, $z = 0.26$, $p = .80$, *SMD* = 0.01 [−0.05, 06]. Finally, we contrasted studies that compared patients against non-clinical controls ($k = 12$) or clinical controls ($k = 8$); the former displayed a numerically larger effect size, *SMD* = 1.03 [0.69, 1.37] vs. *SMD* = 0.78 [0.33, 1.22], respectively, although this difference was not significant, $z = -0.91$, $p = .36$, *SMD* = −0.26 [−0.81, 0.30]. Cumulatively, these analyses suggest that variability in patient-control differences in hypnotic suggestibility is not attributable to inter-study variability in gender distributions, age, or control samples.

4. Discussion

In this study, we conducted a random-effects meta-analysis of hypnotic suggestibility in the DDs and two related conditions (TSDs and FND) in order to quantitatively assess the hypothesis that elevated hypnotic suggestibility is characteristic of individuals with dissociative psychopathology (Bell et al., 2011; Dell, 2017; Janet, 1907). The results provide clear evidence in support of this hypothesis: greater hypnotic suggestibility among patients relative to controls was observed in the aggregate set of studies and in each patient subgroup independently. These results were partially corroborated in the computation of prediction intervals (Riley et al., 2011; Siemens et al., 2021), but only in DD patients. Elevated hypnotic suggestibility was most pronounced among DD patients, which aligns with previous predictions to this effect (Dell, 2017; Mertens and Vermetten, 2018) and implies that hypnotic suggestibility varies according to the severity of dissociative symptomatology or specific constellations of dissociative phenomena (Brown, 2006; Holmes et al., 2005). These results have significant implications for the mechanisms, diagnosis, and treatment of these conditions and have direct bearing on ongoing debates regarding the roles of suggestion and suggestibility in the aetiology of dissociative psychopathology (Dalenberg et al., 2012; Lynn et al., 2019).

Elevated hypnotic suggestibility in the conditions considered here was moderate-to-large in magnitude (*g*s range: 0.66 to 1.25). This was especially pronounced in the DDs, with an effect size ($g = 1.25$) that exceeds the association between childhood abuse/neglect and dissociative experiences ($d = 0.53$) in abused or neglected individuals (Vonderlin et al., 2018), and in non-dissociative clinical samples ($r = 0.33$ [$d = 0.70$]) (Rafiq et al., 2018). This is notable given that trauma is widely recognized as the primary developmental antecedent of dissociative psychopathology (Vonderlin et al., 2018) whereas elevated hypnotic suggestibility in this population has tended to be neglected in recent years (Mertens and Vermetten, 2018). Further analyses attest to the relative robustness of this central result. Prediction intervals (Riley et al., 2011; Siemens et al., 2021) did not overlap with 0 in the DD and DID samples; this suggests that future studies will reliably observe elevated suggestibility in the DD population with at least moderate effect sizes. Jackknife sensitivity analyses further demonstrated that these effects were not driven by any individual studies. Moreover, among the 20 studies included in the meta-analysis, all but four reported significant group differences, three of which were still in the predicted numerical direction. Although the preponderance of positive results is potentially suggestive of publication bias (see Fig. 3), the overall effect size remained moderate after correction for asymmetry. Moreover, variability in effect sizes plausibly reflects heterogeneity between patient subgroups (see below). Indeed, despite robust effects in the DDs, prediction intervals overlapped with 0 for the entire dataset (all subgroups) and patients with FND, plausibly due to heterogeneity across patient subgroups and within FND (see also Wieder et al., 2021). Finally, there was no consistent evidence that effect sizes were related to publication year, sample characteristics, or methodological limitations in the cross-sample analyses although effect sizes in FND were negatively related to clear specification of inclusion/exclusion criteria and diagnostic procedures, as previously reported (Wieder et al., 2021).

4.1. Implications for the mechanisms underlying dissociative psychopathology

The results of these meta-analyses are consistent with a wealth of data pointing to elevated suggestibility in related psychiatric conditions and symptom constellations. Elevated direct verbal suggestibility has been observed in mass psychogenic illness (Sapkota et al., 2020), somatization disorder (Porcelli et al., 2020), and bulimia (Covino et al., 1994; Kranhold et al., 1992; Pettinati et al., 1985; Vanderlinden et al., 1995) (for non-significant results, see Brown et al., 2008; Ciaramella, 2018). Suggestibility has also been cited as a potentially important factor in other conditions with overlapping phenomenology (Haenen et al., 1997; Stumpf et al., 2018; Younger et al., 2007). One interpretation of these converging findings is that elevated hypnotic suggestibility is a characteristic of general psychopathology. However, multiple studies are at odds with this position including those demonstrating low or normal hypnotic suggestibility in individuals with schizophrenia (Pettinati et al., 1990), bipolar disorder (Zhang et al., 2017), anxiety disorders, and obsessive-compulsive disorder (Spinhoven et al., 1991) (but see Ciaramella, 2018). Cumulatively, the extant literature coupled with the present results point to elevated hypnotic suggestibility as a selective signature of dissociative psychopathology.

Despite these convergent results, considering elevated suggestibility in these conditions under the broad umbrella of dissociative psychopathology neglects heterogeneity within and between these conditions and variability in the constellation of dissociative symptoms more broadly (Brown, 2006; Holmes et al., 2005). Indeed, although these disorders are often treated uniformly in discussions of the association between hypnotic suggestibility and dissociative psychopathology (e.g., Dell, 2019), patient subgroup comparisons revealed that the magnitude of elevated hypnotic suggestibility relative to controls was significantly greater in DD (lower bound prediction interval: 0.91) relative to FND patients (lower bound prediction interval: 0.15) and, after the removal of a borderline outlier, TSD patients, with the latter two groups not reliably differing. One interpretation of these group differences is that elevated hypnotic suggestibility covaries with the severity of dissociative psychopathology, yielding the most pronounced level of hypnotic suggestibility in DID. Evidence in favour of this severity hypothesis comes from research showing that hypnotic suggestibility in FND and PTSD correlates with the severity of functional or dissociative symptomatology (Bryant et al., 2001; Kuyk et al., 1995a, 1995b; Roelofs et al., 2002a, 2002b) and that hypnotic suggestibility in DDs is associated with greater self-harming behaviours (Ebrinc et al., 2008), with similar findings in chronic fatigue syndrome (Constant et al., 2011) and eating disorders (Vanderlinden et al., 1995).

Alternatively, elevated hypnotic suggestibility may be a signature of a specific cluster of dissociative experiences referred to as *compartmentalization symptoms* (Brown, 2006; Holmes et al., 2005). These symptoms are believed to be grounded in a disruption of the integration of psychological processes and suggestive of the apparent operation of quasi-independent cognitive systems (Cardeña and Carlson, 2011). Some researchers interpret responsiveness to direct verbal suggestions as a form of compartmentalization (Humpston et al., 2016) and similar cognitive mechanisms are widely cited in various theories of hypnosis (Brown, 2006; Woody and Sadler, 2008). Compartmentalization-specificity would explain greater hypnotic suggestibility in DID than TSD, as the former includes a greater preponderance of compartmentalization symptoms (Brown, 2006). Notably, this account predicts that hypnotic suggestibility will not be elevated in disorders characterized primarily by detachment symptoms. This aligns with the prediction that elevated hypnotic suggestibility is specific to or more pronounced in the dissociative, relative to the non-dissociative, subtype of PTSD (Terhune and Cardeña, 2015) and further suggests that depersonalization-derealization disorder will be characterized by average hypnotic suggestibility (see also Dell, 2019). The latter prediction is indirectly supported by a recent study demonstrating the absence of evidence for elevated direct verbal suggestibility in depersonalization-derealization disorder (Millman et al., 2022).

On the other hand, one challenge for this interpretation is that FND is typically conceptualized as a compartmentalization phenomenon (Brown, 2006), perhaps more so than TSD, yet it was characterized by the lowest hypnotic suggestibility in this meta-analysis. This apparent inconsistency might reflect heterogeneity in the mechanisms and symptomatology of FND or that elevated suggestibility is specific to, or more pronounced for, particular compartmentalization symptoms. Approximately 37–47% of FND patients have comorbid dissociative conditions and those with dissociative comorbidity have been shown to exhibit an earlier onset of functional symptoms and higher broad psychiatric comorbidity (e.g., bipolar disorder), potentially signifying more severe psychopathology (Sar et al., 2004; Yayla et al., 2015). Similarly, dissociative identity distortions, but not absorption, a form of detachment (Brown, 2006), have been shown to correlate with hypnotic suggestibility in patients with an eating disorder (Vanderlinden et al., 1995), identity disturbances have been theoretically tied to suggestibility in histrionic personality disorder (Crawford et al., 2004), and different features of borderline personality disorder have been attributed to elevated direct verbal suggestibility (Dhaliwal et al., 2020; Möller et al., 2020). This interpretation may better explain why hypnotic suggestibility positively correlates with severity of dissociative and functional symptoms in PTSD and FND (Bryant et al., 2001; Kuyk et al., 1995a, 1995b; Roelofs et al., 2002a, 2002b). Further research is required to determine whether elevated suggestibility is reflective of the severity of dissociative symptomatology or a feature of specific compartmentalization symptoms.

The results of this meta-analysis also have direct bearing on current debates regarding the role of suggestion in the aetiology of the DDs (Dalenberg et al., 2012; Lynn et al., 2019). The sociocognitive model (Lynn et al., 2014, 2019) proposes that dissociative symptoms and trauma memories arise from an array of features including iatrogenesis, sociocultural cues, and suggestion, all of which are facilitated by elevated suggestibility in the DDs. Proponents of the trauma model contest these claims and have shown that the DDs do not display atypical response patterns on measures of interrogative suggestibility (Vissia et al., 2016). The present results are at odds with claims by proponents of the trauma model that DD patients are not highly suggestible (Brand et al., 2016). However, insofar as the data are correlational, they also do not provide any evidence for the hypothesized *causal* role of suggestion in the genesis of dissociative symptoms, as proposed by sociocognitive models (Lynn et al., 2019). In contrast with both models, multiple researchers have proposed that high hypnotic suggestibility confers risk for TSDs and DDs in response to trauma (L. D. Butler et al., 1996; Dell, 2019) (see also Keynejad et al., 2019). In support of this view, hypnotic suggestibility has been repeatedly shown to be positively associated with posttraumatic stress symptoms (Bryant et al., 2001; Bryant et al., 2003; DuHamel et al., 2002; Keuroghlian et al., 2010; Yard et al., 2008). By contrast, relatively little attention has been afforded to the converse mechanism that elevated suggestibility is a sequela of the DDs (see also Hilgard, 1979). A sequela model nicely explains the findings that suggestibility varies with length of illness in chronic fatigue syndrome (Constant et al., 2011) and may help to account for the observation that patients with schizophrenia are responsive to hallucination suggestions (Young et al., 1987) despite not displaying elevated hypnotic suggestibility (Frischholz et al., 1992). Longitudinal studies are required to more robustly discriminate between these competing accounts.

Irrespective of the causal path underlying the association between hypnotic suggestibility and dissociative psychopathology, the neurocognitive architecture supporting this association is largely unknown. One proposal that has begun to gain traction as a model of hypnotic suggestion is that distortions in the sense of agency in response to suggestions arise from aberrant metacognition in the form of reduced or delayed awareness of intentions (Dienes and Perner, 2007) see also (Kirsch and Lynn, 1998; Woody and Sadler, 2008). In support of this model, it has been shown that highly suggestible participants display delayed intention awareness (Lush et al., 2016) and selectively reduced metacognition pertaining to their sense of agency (Terhune and Hedman, 2017). Delayed intention awareness has also been observed in FND (Baek et al., 2017; Jungilligens et al., 2020) and conceptually similar results have been reported in those displaying high dissociative absorption (Bregman-Hai et al., 2020). An alternative interpretation of this association can be drawn from predictive processing models of FND (Edwards et al., 2012; Keynejad et al., 2019), and hypnosis (Jamieson, 2021; Martin and Pacherie, 2019). Within the context of predictive processing, highly suggestible individuals may possess an enhanced capacity to form precise symptom priors that override somatic and psychological states, resulting in aberrant motor, cognitive, and perceptual phenomena. Although non-clinical highly suggestible individuals self-report anomalous somatic experiences (Younger et al., 2007), we are unaware of any formal tests of this hypothesis. Evaluating whether aberrant metacognition or predictive processing underlies or mediates elevated suggestibility in these conditions represents an important direction for future research.

4.2. *Implications for the diagnosis and treatment of dissociative psychopathology*

The present results corroborate the clinical practice of using direct verbal suggestions to aid diagnosis of different psychiatric conditions including DD and FND from patients presenting with similar symptom profiles (Mertens and Vermetten, 2018; Popkirov et al., 2015). Multiple studies have demonstrated that DD patients can be discriminated from patients with schizophrenia on the basis of hypnotic suggestibility (Mertens and Vermetten, 2018; van der Hart and Spiegel, 1993). Similarly, suggestive symptom induction protocols are widely used to induce functional symptoms in FND patients (Espay et al., 2009; Popkirov et al., 2015; Stagno and Smith, 1996), with strong specificity but poor sensitivity (Wieder et al., 2021). Owing to its poor sensitivity in FND, suggestive symptom induction is not a suitable standalone diagnostic tool. However, insofar as hypnotic suggestibility predicts the efficacy of suggestive symptom induction (Khan et al., 2009), the present research reaffirms the value of using suggestive symptom induction and standardized suggestibility assessments to complement formalized diagnostic procedures to improve identification of these conditions.

Elevated suggestibility also has the potential to inform treatment of these conditions (Deeley, 2016b). Elevated responsiveness to hypnotic suggestions has been shown to predict treatment outcome in clinical applications of hypnosis (Milling et al., 2021; Montgomery et al., 2011) and there is some evidence that hypnotic techniques may be valuable in

treating FND (Deeley, 2016b; Sanyal et al., 2021), although the quality of the evidence in this area precludes firm conclusions (Ganslev et al., 2020). Insofar as hypnotic suggestibility moderately predicts responsiveness to direct verbal (non-hypnotic) suggestions (Braffman and Kirsch, 1999; Polczyk, 2016; Wieder and Terhune, 2019), patients with DDs and related conditions may also benefit from the inclusion of verbal suggestions in non-hypnotic treatments. Consistent with this, a meta-analysis of abreaction therapy for FND found that the inclusion of suggestions was beneficial for recovery (Poole et al., 2010). On a more cautionary note, there is also the possibility that verbal suggestion and other suggestive techniques (e.g., leading questions; Scoboria et al., 2002) could have potentially serious iatrogenic effects in highly suggestible, and often very vulnerable, individuals if used carelessly or with inadequate training and supervision (Lynn et al., 2014, 2019). Further evaluation of the potential benefits and risks of incorporating verbal suggestion in therapeutic interventions for these conditions is warranted.

4.3. Limitations and future directions

Despite the magnitude of the observed effects, they should be considered in the context of limitations in the design of these studies and seen primarily as a motivator for future research. Although effect sizes did not significantly relate to experimenter masking (Holman et al., 2015), the relatively high proportion (50%) of studies that included unmasked experimenters underscores the need for more widespread use of masked administrations of suggestion protocols. More broadly, it will be important for future studies of elevated suggestibility in these, and other related, conditions to adhere to contemporary methodological and statistical standards such as the use of pre-registration, to minimize methodological and statistical biases, and equivalence tests or Bayesian statistics, to allow for careful assessments of the extent to which data are consistent with the null hypothesis (Keysers et al., 2020).

A further limitation of these studies is that none incorporated a correction for compliance into their indices of hypnotic suggestibility (Acunzo and Terhune, 2021; Bowers et al., 1988; Brown et al., 2008). Direct verbal suggestibility weakly correlates with compliance (Polczyk and Pasek, 2006) and high levels of compliant responding are observed on some suggestions of standardized hypnotic suggestibility scales (Acunzo and Terhune, 2021; Bowers et al., 1988). Previous research found that somatization disorder patients actually displayed less compliant responding than controls (Brown et al., 2008) and similar effects have been reported in highly dissociative non-clinical samples (Terhune et al., 2011). Moreover, DID and PTSD patients do not differ from controls in interrogative suggestibility (Vissia et al., 2016), which primarily indexes compliance (Gudjonsson, 2013). These results suggest that the observed effects of this meta-analysis are highly unlikely to reflect compliance effects; nevertheless, further research on elevated suggestibility in these conditions should index involuntariness during response to suggestion to more robustly distinguish compliant from genuine responding.

Further research will similarly need to incorporate contemporary knowledge of variability in responsiveness to specific suggestion subtypes (Barnier et al., 2022; Woody and Barnier, 2008; Woody and McConkey, 2003). Factor analytic research demonstrates that hypnotic suggestibility is best modelled in a hierarchical structure comprising a core superordinate ability and multiple ancillary subordinate abilities (Woody et al., 2005). In turn, reliance on summary measures of hypnotic suggestibility may mask effects that are specific to particular subordinate abilities. This factor structure is especially salient in the present context because standardized direct verbal suggestibility scales include multiple suggestions for responses that closely resemble dissociative and functional symptoms including motor paralysis, amnesia, and hallucinations (Wieder et al., 2021). Indeed, DD and TSD patients have been shown to display greater responsiveness to suggestions for dissociative symptoms including posthypnotic amnesia (Bryant et al., 2001; Frischholz et al., 1992), with similar effects in non-clinical high dissociative, highly suggestible individuals (Terhune et al., 2011; Terhune and Brugger, 2011). Relatedly, our previous meta-analysis found that FND patients are more responsive to symptom-specific suggestion protocols than standardized suggestibility scales (Wieder et al., 2021). Thus, further research is required to determine whether elevated suggestibility in these conditions reflects elevated general hypnotic suggestibility or is symptom-specific.

A related limitation of the present data is that our analyses were restricted to hypnotic suggestibility. This restriction is because, to our knowledge, only two FND studies, but no DD or TSD studies, have assessed non-hypnotic direct verbal suggestibility. Both of the FND studies (Brown et al., 2008; Goldstein et al., 2000) yielded non-significant results that were significantly lower than studies of hypnotic suggestibility in our recent meta-analysis in FND (Wieder et al., 2021). However, in the latter meta-analysis FND patients still displayed heightened responsiveness to non-hypnotic suggestive symptom induction of functional symptoms. This is further reinforced by results showing moderate to high correlations between reliable measures of hypnotic and non-hypnotic suggestibility (Braffman and Kirsch, 1999; Polczyk, 2016; Wieder and Terhune, 2019). Nevertheless, it will be imperative for future research to clarify whether elevated hypnotic suggestibility is attributable to a generalized capacity to respond to direct verbal suggestions or an induction-specific increase in suggestibility.

4.4. Summary and conclusions

We conducted a random-effects meta-analysis of hypnotic suggestibility in three related conditions (DDs, TSDs, and FND) in 20 datasets. The collective set of patients displayed greater hypnotic suggestibility than controls, as did all patient subgroups with the most pronounced effect in the DDs. These results suggest that elevated suggestibility varies with the severity of dissociative psychopathology or specific constellations of dissociative symptoms. Elevated suggestibility has implications for the mechanisms, risk factors, and treatment of these conditions.

CRediT authorship contribution statement

Lillian Wieder: Conceptualization, Methodology, Software, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization. **Richard J. Brown:** Conceptualization, Formal analysis, Writing – review & editing, Supervision. **Trevor Thompson:** Conceptualization, Formal analysis, Writing – review & editing, Supervision. **Devin B. Terhune:** Conceptualization, Methodology, Software, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Funding acquisition.

Declaration of Competing interest

None of the authors have any competing interests.

Data Availability

The data comprise a meta-analysis and are freely available from the original papers.

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Contributors

All authors conceived the project. LW carried out the database searches and data coding with assistance from RJB, TT, and DBT. LW and DBT performed the meta-analysis with assistance from RJB and TT. LW and DBT drafted the initial manuscript. All authors reviewed and approved the final version of the manuscript Bial Foundation bursary 70/16 (DBT) and Gyllenbergs Foundation fellowship (DBT).

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.neubiorev.2022.104751.

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