How-to study dissociative symptoms: A methodological primer

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Abstract

Dissociation constitutes a transdiagnostic phenomenon not only characterizing dissociative disorders but also occurring across a broad range of psychiatric disorders like posttraumatic stress disorder, borderline personality disorder, depression, and psychosis. In the latter disorders, moderate types of dissociative symptomatology like depersonalization, derealization, or gaps in awareness significantly burden patients' wellbeing and functioning. Many efforts have been undertaken to better understand these debilitating symptoms. However, empirical findings have not yet converged in many areas (e.g., considering neurobiological correlates or effects of dissociative psychopathology on treatment outcome), which might partially be due to the heterogeneity and limitations of employed methodology. Here, we critically review the current state-of-the-art methodology in dissociation research, comparing methods to assess dissociation, provoke dissociation in the laboratory, select the participant sample, and consider critical sample characteristics. Discussing the informative value and limits of various standard and novel methodological approaches, we aim to provide information and nuanced guidance for future research. By these means we aim to raise and harmonize standards in dissociation research and enable researchers of all career stages to enter, navigate, and make a significant and lasting contribution to dissociation research, ultimately contributing to a better understanding of dissociative psychopathology.

Keywords: Dissociation, Guide, Methodology, Assessment, Provocation

1. Introduction

Dissociation is characterized by transient alterations in the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behavior (American Psychiatric Association, 2013). Dissociative symptoms constitute a transdiagnostic phenomenon, occurring not only in dissociative disorders like dissociative identity disorder, dissociative amnesia or depersonalization-derealization disorder but also across a broad range of other mental disorders including posttraumatic stress disorder (PTSD) and borderline personality disorder (BPD; Lyssenko et al., 2018). In the latter disorders, which constitute the primary objective of the current paper, moderate types of dissociative symptomatology like depersonalization, derealization, or gaps in awareness significantly burden the wellbeing and functioning of many patients. Specifically, about 50% of individuals with PTSD report dissociative symptoms like depersonalization, derealization, gaps in awareness or amnesia (White et al., 2022) and up to 80% of individuals with BPD report dissociative symptoms like depersonalization, derealization, amnesia, identity confusion and analgesia (Al-Shamali et al., 2022; Korzekwa et al., 2009; Krause-Utz, 2022). Further, heightened levels of dissociative experiences were found in conversion and somatic symptoms disorders, substance abuse and addictive disorders, eating disorders, schizophrenia, depression, anxiety, and bipolar disorder (Lyssenko et al., 2018).

Building upon a long tradition of descriptions, ideas, and theories about dissociative symptoms starting with Janet in the 19th century (for an overview see Bob, 2003; van der Hart & Horst, 1989), several current theories on dissociative symptoms might be consulted for deriving theoretical assumptions about the dissociation phenomenon itself as well as its causes, correlates, and consequences. As the definition of dissociation as an altered state of consciousness taps into the question of what defines consciousness (Thompson & Zahavi, 2007), there are many levels on which theories can be located. On a very basic level, theories differ regarding assumptions about the etiology of dissociative symptoms, with some stressing their link to stress and trauma exposure and others focusing more on socio-cognitive processes like fantasy-proneness (see also Dalenberg et al., 2012; Giesbrecht, Lynn, et al., 2008). Here, we focus on trauma-related dissociation and give a short overview of prominent current theories in Table 1.

Table 1. Prominent theoretical models of trauma-related dissociative symptoms

	Brief description	Assumptions about	Representative publications
Focus on moderate forms of dissociation common in various clinical populations with trauma history			
Cortico-limbic inhibition model	This model particularly focuses on depersonalization and postulates that it involves increased alertness as well as dampened autonomic arousal and emotions mediated by prefrontal inhibition of limbic regions.	• neural activation • psychophysiology • cognitive symptoms • emotion	Sierra & Berrios, 1998
Defense-cascade models	This group of theories conceptualize dissociation as part of an automatically activated, biologically grounded set of defense-responses to threats. They propose an inverted U-shaped association between dissociation and physiological arousal/ negative emotions.	• evolutionary function • etiology • neural activation • psychophysiology • perception • cognition • emotion • behavior	Kozlowska et al., 2015; Lanius et al., 2018; Mobbs et al., 2009; Schauer & Elbert, 2010
Emotion modulation model (can be integrated within the larger framework of defense-cascade models)	This model conceptualizes dissociation as a form of emotion dysregulation involving emotional overmodulation mediated by prefrontal inhibition of limbic regions.	• neural activation • emotion	Lanius et al., 2010, 2012
4-D-model	This model classifies PTSD symptoms into those occurring within normal consciousness and those linked to altered states of consciousness, i.e., dissociation.	• (co-) occurrence of dissociative and other PTSD symptoms • etiology	Frewen & Lanius, 2014
Triple network model	This model hypothesizes about functional connectivity in depersonalization/ derealization, dissociative intrusions, and dissociative identity disorder.	• neural activation	Lebois et al., 2022
Cognitive behavioral model	This model understands dissociation as a product of associative conditioning and deducts potential interventions.	• etiology • cognitive processes • emotion • behavior	Vancappel & El-Hage, 2023
Broader focus or focus on more severe, structural forms of dissociation			
BASK model of dissociation	This model illustrates how dissociation can interrupt consciousness within four dimensions normally congruent across a space/time continuum (behavior, affect, sensation, knowledge) and suggests respective treatment options	• cognitive processes • emotion • behaviour	Braun, 1988
The domain of dissociation model	This model describes three main domains of dissociation as (i) nonconscious or nonintegrated mental modules or systems, (ii) an alteration in consciousness including	• evolutionary function • cognitive processes	Cardeña, 1994

	disconnection from self or environment, or (iii) as defense mechanism.		
Compartmentalization-detachment/ bipartite model of dissociation	This model distinguishes between dissociative symptoms in normal (detachment) and more severe, trauma-related (compartmentalization) aspects	• cognitive processes • emotion • behavior	Brown, 2006; Holmes et al., 2005
The theory of structural dissociation of the personality	This theory categorizes trauma-related dissociation along three severity stages (primary, secondary, and tertiary dissociation) and assumes structurally distinct identity states.	• evolutionary function • psychophysiology • cognition • emotion	Nijenhuis et al., 2010; Nijenhuis & van der Hart, 2011

A variety of meta-analytical and systematic reviews have been published in the past decades summarizing the current state of evidence on dissociation and its neurobiological (Lotfinia et al., 2020; Roydeva & Reinders, 2021), autonomic (Beutler et al., 2022; Boulet et al., 2022; Roydeva & Reinders, 2021), and genetic (Roydeva & Reinders, 2021) correlates as well as associations with treatment outcome (Hoeboer et al., 2020) and emotion regulation (Cavicchioli et al., 2021). However, the summarized literature reflects little convergence, for instance regarding the extracted biomarkers of pathological dissociation. On a neurobiological level, most structural and functional aberrations were found in the frontal lobes and tentative support exists for divergent activation patterns between individuals diagnosed with dissociative identity disorder and/or dissociative PTSD and individuals diagnosed with depersonalisation/derealisation disorder (Blihar et al., 2020; Lotfinia et al., 2020; Roydeva & Reinders, 2021). However, across studies, there is insufficient empirical evidence that pathological dissociation is linked to limbic hypoactivation, especially with regards to the amygdala. Autonomic measurements (e.g., heart rate or blood pressure) are also inconsistent to date; no robust evidence exists yet supportive of the hypothesis that dissociation is associated with a blunted physiological response to (traumatic) stressors. These inconsistencies may be partially explained by the heterogeneity of prior work, methodological limitations as well as power issues (Beutler et al., 2022; Boulet et al., 2022; Roydeva & Reinders, 2021).

Consequently, reviews and meta-analyses highlight the need to raise and harmonize standards in dissociation research. The current methodological primer aims to assist researchers in doing so. Reviews and meta-analyses recognize the need for more rigorous diagnostic approaches, combining interview-based assessments with questionnaires to mitigate false positives and false negatives (Blihar et al., 2020). It has further been recommended, especially in biomarker research, to focus on specific symptoms (e.g., derealization) and thoroughly choose suitable dissociation measures (Roydeva & Reinders, 2021). Authors across reviews also noted that the distinction made between

state and trait dissociation is useful; future researchers are encouraged to assess both within their study designs to disentangle their overlapping and discrete (biological) correlates (Beutler et al., 2022; Sar & Ross, 2023). **To assist researchers in selecting suitable dissociation measures, we give an overview of common dissociation measures and important decision criteria in *Section 2.*** As most existing research is observational, reviews further call for the use of experimental manipulation techniques to induce or inhibit a dissociative response in the laboratory (Beutler et al., 2022; Lotfinia et al., 2020). **To help researchers selecting and employing dissociation induction methods suitable for their research questions, we review and compare established and novel methods in *Section 3.*** Further, reviews have noted that limited generalizability of existing data (e.g., predominantly female samples) might call for more heterogeneous participant sampling, while specificity concerns emphasize the need to control for confounding factors for instance by examining homogeneous (sub-)samples (Beutler et al., 2022; Roydeva & Reinders, 2021). **Hence, we dedicate *Section 4* to providing guidance in considering critical sample characteristics**. By these means, the current methodological primer might help researchers addressing the limitations and considerations identified by meta-analyses and systematic reviews, which is paramount for advancing our understanding of trauma-related dissociative symptoms.

2. Assessing dissociation

An important challenge in dissociation research is to choose measures of dissociation suitable for one's research question. To establish diagnoses (for instance to check in- or exclusion criteria or to determine group membership), one might use a combination of diagnostic interviews and self-report measures. To (repeatedly) assess the severity of chronic dissociative symptoms or acute state dissociation, self-report measures might be particularly suitable.

Diagnostic interviews. The Structured Clinical Interview for DSM-IV Dissociative Disorders (SCID-D; Steinberg, 1993, 1994) was the first interview developed to assess dissociative symptoms (i.e., amnesia, depersonalization, derealization, identity confusion, identity alteration) and establish DSM-IV diagnoses of dissociative disorders (American Psychiatric Association, 1994). A novel alternative to the SCID-D is the Trauma and Dissociation Symptoms Interview (TADS-I; Boon, 2023) capturing various facets of pathological dissociation as conceptualized in the ICD-11 (World Health Organization, 2019). To assess symptoms of and diagnose the DSM-5 dissociative subtype of PTSD (American Psychiatric Association, 2013), one might use the Clinician Administered PTSD Scale for DSM-5 (Weathers et al., 2013a, 2018) or the dissociative subtype of PTSD interview (DSP-I; Eidhof et al., 2019). Further, to assess acute dissociative symptoms (i.e., depersonalization, derealization, amnesia) in healthy and clinical samples (e.g., PTSD, dissociative disorders, affective disorders), one might employ the Clinician-Administered Dissociative States Scale (CADSS; Bremner et al., 1998) administering 27 items (19 subject-rated, 8 observer-rated) in interview form on a Likert-scale from 0 (not at all) to 4 (extremely).

A revised version (Bremner, 2014; Mertens & Daniels, 2022) includes four new subject-rated items and removed several observer items, resulting in a 28-item scale containing 23 subject-rated and five observer-rated items. Further, a brief version (CADSS-6; Rodrigues et al., 2021) includes six items most sensitive to ketamine-induced dissociation in individuals with treatment resistant depression. Finally, to assess the severity of physical alterations assumed to accompany trauma-related dissociative symptoms based on defense cascade models, one might use the Shutdown Dissociation Scale (Shut-D; Schalinski et al., 2015).

Self-report measures. When choosing dissociation self-report measures, one needs to consider several factors: (1) the ***dissociative phenomena*** of interest (e.g., depersonalization, derealization, gaps in awareness); (2) the ***sample*** of interest (e.g., healthy individuals, individuals with certain disorder(s)); (3) the ***time period*** during which one wants to assess dissociation (e.g., trait dissociation/ overall dissociation proneness, dissociative symptoms across several days/weeks, acute dissociation); and (4) the ***quantitative aspects of dissociation*** one wants to investigate (e.g., frequency of the dissociative experience and/or intensity of dissociation). Further, studies examining acute dissociation might also consider (5) the ***paradigm employed to elicit dissociation*** and (6) the ***task during which the acute dissociation level is assessed*** (which may or may not overlap with the provocation paradigm). Importantly, these factors are closely interweaved with one another and need to be considered together, making the choice of measure a complex decision. While different research questions hence warrant different measures and no general recommendations can be given for or against certain measures, we deem it crucial to make an informed decision when selecting dissociation measures. Therefore, one needs to carefully determine one's needs regarding the reviewed decision criteria, eventually prioritize between them, and check eligible measures. To facilitate this process, common self-report measures of dissociation are described in Table 2 considering the reviewed criteria. Upon identifying one or several candidate measures based on these practical criteria, a further important step is to check the psychometrics of the respective measure and the availability of a validated version in the study language (for a first attempt to facilitate this final step, please refer to Wainipitapong et al., 2023).

For instance, imagine planning a study assessing the effectiveness of a novel 3-months treatment for dissociative symptoms in individuals with PTSD and/or BPD (*sample*). Your intervention particularly addresses gaps in awareness, which you therefore consider your primary outcome, yet you would also be interested in effects on other dissociative phenomena common in the target group (*phenomena*). You might want to employ a measure assessing dissociation in a period long enough to reflect a somewhat persistent psychopathology level but also short enough to be able to capture change over time. Hence, you take measures assessing dissociative symptom severity, preferably for a rather short number of weeks, into further consideration (*time period*). Among the measures

summarized in Table 1, both the Dissociative Symptoms Scale (DSS; Carlson et al., 2018) and the Dissociative Subtype of PTSD Scale (DSPS; Wolf et al., 2017) meet your primary requirements, however, they cover different additional dissociative phenomena, and you might have preferences for one or the other based on theoretical assumptions about your intervention and expected prevalence of those phenomena in your sample. Finally, you might also want to consider which kind of symptom alleviation your intervention aims to achieve. If you aim to achieve and assess effects on the frequency of dissociative symptom occurrence, you can use both, the DSPS and the DSS. Yet, if you also want to weigh in symptom intensity, you might prefer to use the DSPS.

As another example, imagine planning a study on neural alterations during acute depersonalization and derealization (*time period, phenomena*) in individuals with PTSD (*sample*). You want to provoke dissociation using script-driven imagery during neuroimaging and repeatedly assess acute dissociation intensity during the session which is why you are looking for a brief measure (*paradigm*). According to Table 2, both the Dissociation subscale of the Responses to Script-Driven Imagery Scale (RSDI; Hopper, Frewen, Sack, et al., 2007) and the 4-item version of the German Dissoziations-Spannung-Skala (Dissociation Tension Scale- 4; DSS-4; Stiglmayr et al., 2009) might suit your purposes. Taking a closer look at these measures, the RSDI has been developed specifically for script-driven imagery, while the DSS-4 has been tailored to neuroimaging settings. While the RSDI assesses depersonalization and derealization with two items each, the DSS-4 assesses depersonalization, derealization, somatoform dissociation, and analgesia with one item each. Hence, you need to weigh in more detailed depersonalization/ derealization assessment vs. an additional assessment of other dissociative symptoms and prioritize one approach or the other.

Table 2. Common self-report measures of dissociation

Measure	Dissociative phenomena and corresponding subscales	Format	Time period	Quantitative aspects	Commonly used for	Other versions
Dissociative symptoms during an undefined time period (often referred to as *trait dissociation/ dissociation proneness*)						
Dissociative Experiences Scale (DES) (Bernstein & Putnam, 1986)	Pathological and nonpathological dissociative experiences in daily life; 3 subscales, including absorption/ imaginative involvement, amnesia, depersonalization/ derealization	28 items, Visual Analogue Scale from 0% (never) to 100% (always)	None	Frequency	Assessing tendencies to dissociate in community and clinical samples	• DES-II (Carlson & Putnam, 1993) – Response format changed to a 11-point Likert scale from 0% to 100% of time • DES-Revised (DES-R; Dalenberg et al., 1994) – Response format changed to an 8-point Likert scale from "never" to "daily or more often" • DES-Comparison (DES-C; Wright & Loftus, 1999) - response format changed to a 11-point Likert scale from "much less than others" to "much more than others" • DES-Taxon (DES-T; Waller & Ross, 1997)- 8-item version capturing pathological dissociation only • FDS-20 (Spitzer et al., 2004) - brief German 20-item version including items with highest discriminatory power, adapted instruction referring to the last 14 days, same response format as original
Multidimensional Inventory of Dissociation (MID; Dell, 2006)	Pathological dissociative experiences; 12 dissociation factors, including self-confusion, angry intrusions, dissociative disorientation, amnesia, distress about memory problems, subjective experience of the presence of alternate personalities, derealization/depersonalization, persecutory intrusions, trance, flashbacks, body symptoms, circumscribed loss of remote autobiographical memory; 6 validity scales, including defensiveness, emotional suffering, rare symptoms, attention-seeking behavior,	218 items (168 dissociation items and 50 validity items), Likert scale from 0 (never) to 10 (always)	None	Frequency	Comprehensively assessing the entire domain of dissociative phenomena	• Adult version: 7th grade (US) or higher reading comprehension level • Adolescent version: less formal language, some items modified to be more age-congruent

	factitious behavior, severe borderline personality disorder index					
Trait Dissociation Questionnaire (Murray, 1997)	Dissociative experiences; seven subscales, including detachment from others and world, sense of split self, lability of mood and impulsivity, inattention and memory lapses, emotional numbing, confusion and altered time sense, amnesia for important life events	38 items, Likert scale from 0 (never) to 5 (always)	None	Frequency	Assessing pre-traumatic disposition for dissociative experiences	• TDQ-s (Murray et al., 2002) – brief 10-item version
Dissociative symptoms during a time period of weeks/months (also often referred to as *dissociative symptom severity*)						
Cambridge Depersonalisation Scale (CDS; Sierra & Berrios, 2000)	Depersonalization	29 items, Frequency ratings on a Likert scale from 0 (never) to 4 (all the time), duration ratings on a Likert scale from 1 (few seconds) to 6 (more than a week)	Past 6 months	Frequency and Duration	Individuals with depersonalization disorder	• CDS-2 (Michal et al., 2010) – brief 2-item version with the two items discriminating best between individuals with and without depersonalization disorder
Černis Felt Sense of Anomaly Scale (ČEFSA; Černis et al., 2021)	Dissociative symptoms with a felt sense of anomaly as core feature occurring across a broad range of mental health disorders; 7 subscales including anomalous experiences of the self, body, and emotion, altered senses of familiarity, connection, agency, and reality. Compartmentalization, detachment, derealization, and depersonalization included as combination of different domains.	35 items, Likert scale from 0 (never) to 4 (always)	Past 2 weeks	Frequency	Assessing dissociative symptoms in non-clinical individuals (including those with trauma symptoms) and individuals with psychosis	None
Dissociative Symptoms Scale	Dissociative symptoms relevant to several clinical populations, including those with	20 items, Likert scale from 0	Past week	Frequency	Assessing dissociative symptoms in different	• DSS-Brief Form (DSS-B; Macia et al., 2023) – brief 8-item version

(DSS[1]; Carlson et al., 2018)	trauma-related dissociation; 4 subscales, including depersonalization/ derealization, gaps in awareness and memory, sensory misperceptions, dissociative reexperiencing	(not at all) to 4 (more than once a day)			clinical populations including those with trauma-related dissociation	
Dissociation Tension Scale (German: Dissoziations-Spannungs-Skala; DSS[1]; C. Stiglmayr et al., 2010)	Dissociative symptoms (ranging from normal up to pathological) and inner tension; Psychological dissociation: derealization, depersonalization, amnesia, absorption, pseudo-hallucinatory experience; somatoform dissociation: immobility, optical and acoustical changes, changes in language generation; no subscales	22 items (21 dissociation, 1 tension), Likert scale from 0% (never) to 100% (constantly)	Past week	Frequency	Assessing dissociative symptoms in individuals with borderline personality disorder	• For state versions (DSS-acute, DSS-4) see below
Dissociative Subtype of PTSD Scale (DSPS; Guetta et al., 2019; Wolf et al., 2017)	Dissociative symptoms frequently experienced by trauma survivors, including those defining the dissociative subtype of PTSD according to the DSM-5; 3 subscales, including depersonalization/ derealization, loss of awareness, psychogenic amnesia	15 items, lifetime prevalence rated as yes/no, frequency in the past month rated on a Likert scale from 0 (never) to 4 (daily); intensity in the past month rated on a Likert scale from 0 (not applying) to 5 (extremely strong);	Life-time + Past month	Frequency, Intensity, Severity (combination of frequency and intensity)	Assessing dissociative symptoms in trauma-survivors with and without PTSD, screening for D-PTSD diagnosis, identifying individuals at risk for dissociative responding to trauma-focused treatment	• Version covering lifetime + past 2 weeks (Danböck, Hettegger, et al., 2023) to facilitate the detection of treatment effects
Multiscale Dissociation Inventory (MDI;	Level of dissociative disturbances; 6 subscales, including disengagement, depersonalization, derealization, emotional	30 items, Likert scale from 1 (never) to 5	Past month	Frequency	Assessing dissociative dimensions in clinical, community, and	None

[1] Please note that there exist two independent dissociation scales using the same acronym “DSS”

Briere, 2002)	constriction/numbing, memory disturbance, identity dissociation	(very often)			university samples	
Somatoform Dissociation Questionnaire (SDQ-20; Nijenhuis et al., 1996)	Somatoform dissociative symptoms which had appeared upon reactivation of dissociative personality parts in clinical populations and could not be medically explained; Positive symptoms (e.g., pain perception without painful stimulus) and negative symptoms (e.g., loss or reduction of perception); no subscales	20 items, Likert scale from 1 (this applies to me NOT AT ALL) to 5 (this applies to me EXTREMELY)	Past year	Severity (some items refer to frequency and/or intensity)	Assessing somatoform indicators of structural dissociation/ screening for dissociative disorders in clinical samples	• SDQ-5 (Nijenhuis, 2010)– brief 5-item screener
Dissociative symptoms during a time period of secs/minutes (often referred to as *state dissociation* or *acute dissociation*)						
Dissociation Tension Scale- acute (DSS-acute; Stiglmayr et al., 2003)	Acute dissociative symptoms (ranging from normal up to pathological) and inner tension; Psychological dissociation: derealization, depersonalization, amnesia, absorption, pseudo-hallucinatory experience; somatoform dissociation: immobility, optical and acoustical changes, changes in language generation	22 items (21 dissociation, 1 tension), Likert- scale from 0 (none) to 9 (very strong)	State	Intensity	Assessing acute dissociation in healthy and clinical samples (e.g., borderline, depression, panic disorder)	• DSS-4 (Stiglmayr et al., 2009)– short 4-item state version including pathological symptoms only (depersonalization, derealization, somatoform dissociation, analgesia) and only items compatible with neuroimaging settings (e.g., no questions about difficulties coordinating movements) • For the version covering a week (DSS) see above
Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar et al., 1997)	Dissociative symptoms: derealization, depersonalization, altered time sense, amnesia, out of body experience	10 items; Likert-scale from not at all (0) to extremely (4)	State	Intensity	Assessing state dissociation during a traumatic event or a trauma analogue (e.g., trauma film) in healthy or clinical samples; also used to assess state dissociation during symptom provocation	• Versions adapted for trauma film studies (Danböck et al., 2021; Kindt et al., 2005) – excluding items not appropriate for film paradigms
Response to Script-driven Imagery Scale, Subscale dissociation (RSDI; Hopper, Frewen, Sack, et al., 2007)	Dissociative and PTSD symptoms; three subscales, including dissociation (depersonalization, derealization), avoidance, re-experiencing	11 items, including 4 dissociation items, 4 re-experiencing items, 3 avoidance items, Likert-scale from 0	State	Intensity	Assessing acute dissociation during symptom provocation (e.g., via script-driven imagery) in clinical samples (e.g., PTSD, borderline)	None

State Scale of Dissociation (Krüger & Mace, 2002)	Changes in and the severity of acute dissociative symptoms; 7 subscales including derealization, depersonalization, identity confusion, identity alteration, conversion, amnesia and hypermnesia	(not at all) to 6 (a great deal) 56 items	State	Intensity	Assessing correlations between changes in dissociative states and concurrent physiological parameters	None

3. Provoking dissociation in the laboratory

To gain more insight into acute dissociation, it is essential to experimentally elicit acute dissociative states in the laboratory via so-called symptom provocation paradigms. Thereby, dissociative symptoms are provoked which are intensity-wise weaker or comparable to those regularly experienced by the study participants in real-life. Experimental dissociation induction methods differ greatly from one another, and some might be more and others less suitable for specific research questions. Hence, it is important to carefully reflect upon the choice of strategy when planning a new study and tailor it to the primary research question.

Aversive stimulation. A classic way to induce dissociation is via aversive stimulation. Specifically, participants can be exposed to aversive film clips (e.g., Chou et al., 2014; Danböck et al., 2021; Danböck, Franke, et al., 2023; Holmes et al., 2004, 2006), aversive audios (e.g., narratives of shameful autobiographic memories; Kouri et al., 2023) or painful stimulation such as electrical stimulation (Danböck, Franke, et al., 2023) or holding their arm in ice water (e.g., Giesbrecht, Smeets, et al., 2008; Gómez-Pérez et al., 2013; Horowitz & Telch, 2007). Further, individuals with trauma history can also be exposed to trauma reminders to evoke dissociation, using paradigms like script-driven imagery (e.g., Danböck, Liedlgruber, et al., 2024; Hopper, Frewen, van der Kolk, et al., 2007; Krause-Utz et al., 2021; Mertens et al., 2022; Sack et al., 2012). During script-driven imagery, participants recall and vividly imagine a prior personal traumatic experience, while listening to an auditive narrative of the situation. The degree to which those narratives are standardized within and across participants varies between studies, ranging from a standardization of event type, duration, and writing style (e.g., present tense, second person, if possible in participant's words; Sack et al., 2012) to paradigms in which also the content of narratives is highly standardized (e.g., fixed minimum number of thoughts, emotions, perceptions, etc.; Danböck, Liedlgruber, et al., 2024). Further, some studies have participants talk about their traumatic event (Griffin et al., 1997). Importantly, aversive film clips, painful stimulation, and trauma-reminders not only induce dissociation but also a variety of other stress responses including negative subjective experiences, autonomic and neural alterations, and behavioral changes (for reviews see for instance James et al., 2016; Pole, 2007). Therefore, they might be understood as **unspecific strategies** to induce dissociation. However, these strategies closely resemble real-life triggers of dissociation described by individuals with D-PTSD (Vancappel et al., 2022), emphasizing their **ecological validity**. These strategies might thus be particularly suited for studies aiming to observe correlations between dissociation and other constructs but are not fit to answer questions about causal effects on one another.

Strategies targeting perception. Another approach to elicit dissociation in the laboratory is via approaches which can be loosely summarized as strategies targeting perception. For instance, one can ask participants to stare at a dot (Leonard et al., 1999; Lickel et al., 2008; Miller et al., 1994), at a

rotating spiral (Danböck et al., in prep.; Dorahy et al., 2016; Lickel et al., 2008), at their own face or body in a mirror (Caputo, 2010; Miller et al., 1994; Shin et al., 2019), or at another person's face (Caputo, 2015). Further, one might also expose participants to pulsed audio-photic stimulation, i.e., a ticking metronome sound combined with pulsing light, or stimulus-deprive them (Leonard et al., 1999). Furthermore, one might use vision-deforming glasses (Renard et al., 2018) or simulate an out-of-body experience via virtual reality (van Heugten-van der Kloet et al., 2018). Finally, one might also hypnotically induce dissociative states (Danböck et al., in prep.; Hagenaars et al., 2008; Holmes et al., 2006). Overall, strategies targeting perception differ greatly from one another, with only few studies directly comparing different strategies to one another regarding dissociation intensity (Danböck et al., in prep.; Dorahy et al., 2016; Leonard et al., 1999; Miller et al., 1994), one study comparing dissociation quality (Danböck et al., in prep. , and no study comparing or even examining perceptual mechanisms at play. Hence, it is beyond the scope of the current work to pinpoint the advantages and disadvantages of specific strategies. However, some of these strategies might constitute promising tools for a **more selective manipulation of dissociation** (as compared to strategies working via aversive stimulation) which might enable the examination of **causal effects** of induced dissociation on other (not automatically co-manipulated) constructs like negative affect, physiological and behavioral alterations. Yet, thereby it might be crucial to consider the **fit between the research question, dissociation induction strategy, and sample**, which can be illustrated in the example of mirror-gazing: When mirror-gazing, a presumable unemotional dissociation induction strategy, was employed in healthy individuals to investigate causal effects of a dissociation manipulation on emotional responses to affective pictures, it successfully induced dissociation with no differences in negative affect (Shin et al., 2019). Consequently, the authors were able to examine causal effects of dissociation manipulation on emotional responses to affective pictures. However, when mirror-gazing was employed in individuals diagnosed with dissociative disorders (Schäflein et al., 2018) or individuals with PTSD (Borgmann et al., 2014), the task itself was perceived as distressing, which might be explained by the fact that prolonged self-perception of one's face or body might function as trauma-reminder in these populations. Hence, while mirror-gazing might be a suitable paradigm to study causal effects of dissociation on emotions in healthy individuals, it might not be suitable to examine causal effects of dissociation on emotions in individuals with trauma history. In this context it might rather be understood and used as a paradigm evoking unspecific, but naturalistic stress responses which can be studied correlatively.

Strategies targeting physiological arousal. Furthermore, dissociation might also be elicited via physical and pharmacological strategies targeting physiological arousal. For instance, one study elicited dissociation via hyperventilation (Lickel et al., 2008) and another study tried to use norepinephrine to increase amygdala reactivity and thereby elicit dissociation (Mertens et al., 2023).

The latter study was, however, not successful (Mertens et al., 2023), stressing the need to further validate dissociation induction strategies supposedly working via physiological arousal. Those could, for instance, enable researchers to study causal effects of physiological arousal on dissociative states.

Pharmacological agents. Finally, studies have demonstrated dissociative effects of various pharmacological agents including ketamine (Danböck, Duek, et al., 2024; Dehestani et al., 2022; Duek et al., 2019; Krystal, 1994; Short et al., 2018), other N-methyl-D-aspartate receptor (NMDAR) antagonists (Niciu et al., 2018; Piazza et al., 2022), 3,4-Methyl enedioxy methamphetamine (MDMA) (van Heugten-Van der Kloet et al., 2015), cannabis (van Heugten-Van der Kloet et al., 2015) and the opioid receptor agonist salvia divinorum (Addy et al., 2015). To better understand which pharmacologically induced dissociative states are comparable to dissociative states spontaneously emerging in individuals with trauma-history, first studies have started to compare subjective qualities of ketamine/opioid-induced dissociation and naturally occurring dissociation. While first findings indicate that dissociative states induced by ketamine and other NMDAR antagonists psychometrically resemble dissociative symptoms experienced by trauma survivors (Niciu et al., 2018; Piazza et al., 2022), similar investigations on other agents are still lacking.

Ethical considerations. When employing symptom provocation paradigms, it is of utmost importance to adhere to high ethical standards. First, participants need to be informed which symptoms are to be elicited during the study, how long they will presumably last and when and how the study team will assist them in managing those symptoms. For effective support during both diagnostic assessments and experimental procedures, the research team must possess the necessary knowledge and skills to assist individuals experiencing dissociative symptoms. Means to counteract dissociative symptoms should be employed as soon as the dissociative state is no longer needed for the experiment, latest at the end of the session, to ensure that the dissociative state has subsided before participants are sent home. Grounding techniques such as guiding participants to describe their surroundings or sensory stimulation techniques like pleasant odors can be helpful when individuals report diminished perception (see Chessell et al., 2019; Schauer & Elbert, 2010). Additionally, if there is a physiological shift towards a shutdown and parasympathetic dominance of the autonomic nervous system, motoric activation strategies like applied tension techniques should be employed. It's essential to be mindful of reduced awareness and adapt communication by using simple phrases and addressing the individual by their given name. Support should be provided as long as necessary to ensure the individual is well enough to leave the research setting. For more detailed information on anti-dissociative techniques see the supplement. Please also note that with the methods common in trauma and biopsychological research, dissociation might also sometimes be provoked unintentionally. For instance, detailed interviews on traumatic experiences and posttraumatic psychopathology, other aversive paradigms, and the (sensation-depriving) MRI setting might

unintentionally provoke dissociative symptoms (see also Michal et al., 2007). Therefore, we recommend optimizing study settings to minimize dissociative side effects and/or adhering to the same ethical standards as when dissociation is intentionally provoked.

4. Considering critical sample characteristics

There are critical features that contribute to heterogeneity within and across study samples which need a nuanced approach in both research and clinical understanding. Of particular interest when designing, analyzing, and reporting a study examining dissociative symptoms are those sample characteristics which have been empirically linked to the intensity or quality of dissociative symptoms. Those should be critically considered when investigating this complex phenomenon. Below, we summarized the state of evidence on the link between dissociation, trauma history (with a special focus on childhood maltreatment), age, gender, and other potentially relevant sample characteristics and deduct recommendations for future research.

Trauma History. A meta-analytic review suggests that childhood maltreatment and trauma play a key role in the pathogenesis of dissociation (Dalenberg et al., 2012), while, particularly, childhood physical and sexual abuse as well as neglect are most important risk factors for adult symptoms of dissociation (for a metaanalysis see Vonderlin et al., 2018). Furthermore, the number of different types of traumatic experiences across the lifespan are associated with increased levels of dissociation (Schalinski et al., 2019). Both experiencing trauma throughout one's lifetime and enduring maltreatment during childhood emerged as significant predictors of trauma-related dissociation (Frewen et al., 2019), and are a critical factor that call for delineation in research (Teicher et al., 2022). Furthermore, it is worth noting that childhood maltreatment is not only linked to dissociation itself but has also been associated with neurobiological alterations (Kerr et al., 2021; Teicher et al., 2016), which also often serve as outcome in dissociation research (Roydeva & Reinders, 2021).

Age. Regarding age, several large-scale studies indicate that across different populations (e.g., children, adults, veterans, clinical and non-clinical samples, victims of childhood abuse and neglect), younger individuals are more prone to dissociative symptoms than older individuals (e.g., Espirito Santo & Luís Pio-Abreu, 2008; Herzog et al., 2020; Spitzer et al., 2006; Vonderlin et al., 2018; White et al., 2022). One possible explanation for this rather consistent finding could be that younger individuals, in contrast to older individuals, are less capable to physically remove themselves from stressful situations, specifically with a primary caregiver being the perpetrator, and use dissociation as an easily accessible coping mechanism to reduce distress in adverse environments (White et al., 2022).

Gender. Studies on associations between dissociation and gender are far more inconsistent. While some studies found that dissociation is more prevalent in either women (Espirito Santo & Luís Pio-Abreu, 2008; Irish et al., 2011) or men (Seedat et al., 2003), the majority of studies indicate no significant gender differences in dissociation (Maaranen et al., 2005; Punamäki et al., 2005; Sayar et

al., 2005; Spitzer et al., 2003; Tolmunen et al., 2007; Vonderlin et al., 2018). One reason for these inconsistent findings might be that while men and women generally do not differ in dissociation, they might differ in specific dissociative symptom types (e.g., Maaranen et al., 2005). Moreover, a longitudinal study in sexually abused children suggests that dissociative symptoms might change differently in boys and girls, with girls displaying a decline and boys showing an increase in dissociative symptoms over time (Bernier et al., 2013).

Other factors. In addition to trauma history, age and gender, a growing body of research has targeted other characteristics which could potentially give rise to dissociative experiences, such as education (Espirito Santo & Luís Pio-Abreu, 2008), hormones (Bryant et al., 2011; Lee et al., 2022), cultural background (Krüger, 2020), social media (Porter et al., 2024), hypnotizability (Dell, 2017), fantasy proneness (Merckelbach et al., 2022), hyperassociativity (Huntjens et al., 2021), alexithymia (Elzinga et al., 2002), and vertigo (Tschan et al., 2013). More research is needed to better understand how these characteristics influence the clinical and non-clinical presentation of trauma-related dissociative experiences and, therefore, how they can be taken into consideration when studying dissociation. Further, when preparing participant instructions, one might also consider, assess, and standardize factors which might boost dissociative responding to symptom provocation (e.g., sleep; Giesbrecht et al., 2007; van der Kloet et al., 2012; van Heugten – van der Kloet et al., 2015) and factors generally known to alter stress responses like (de-)hydration (Watso & Farquhar, 2019), time of the day (Roeser et al., 2012), and caffeine/ nicotine/ drug intake.

Recommendations. Altogether, the current state of evidence supports links between trauma exposure characteristics and age and occurrence, severity, and endurance of dissociative symptoms, is ambiguous regarding gender, and in an early phase regarding other sample characteristics. Further, a broad range of mental disorder symptoms have been consistently linked to dissociative symptoms (see introduction; Lyssenko et al., 2018).

Accordingly, we first and foremost recommend characterizing one's study sample carefully regarding all mentioned features (especially age, trauma exposure, and psychopathology) when investigating dissociative experiences. Particularly, we recommend characterizing participants' trauma history with greater precision (for reviews of measures see Danese, 2020; Gadeberg et al., 2017; Tolchin et al., 2023). For instance, one might assess the types and timing of childhood maltreatment using the Maltreatment and Abuse Chronology of Exposure' Scale (MACE; Teicher & Parigger, 2015) or the Childhood Trauma Questionnaire (CTQ or CTQ-SF; Bernstein et al., 2003) and combine one of these instruments with a lifetime trauma measure like the Life Events Checklist (LEC; Weathers et al., 2013b). Further, all common comorbidities of the studied disorder which have been linked to dissociative symptoms should be assessed with validated questionnaires.

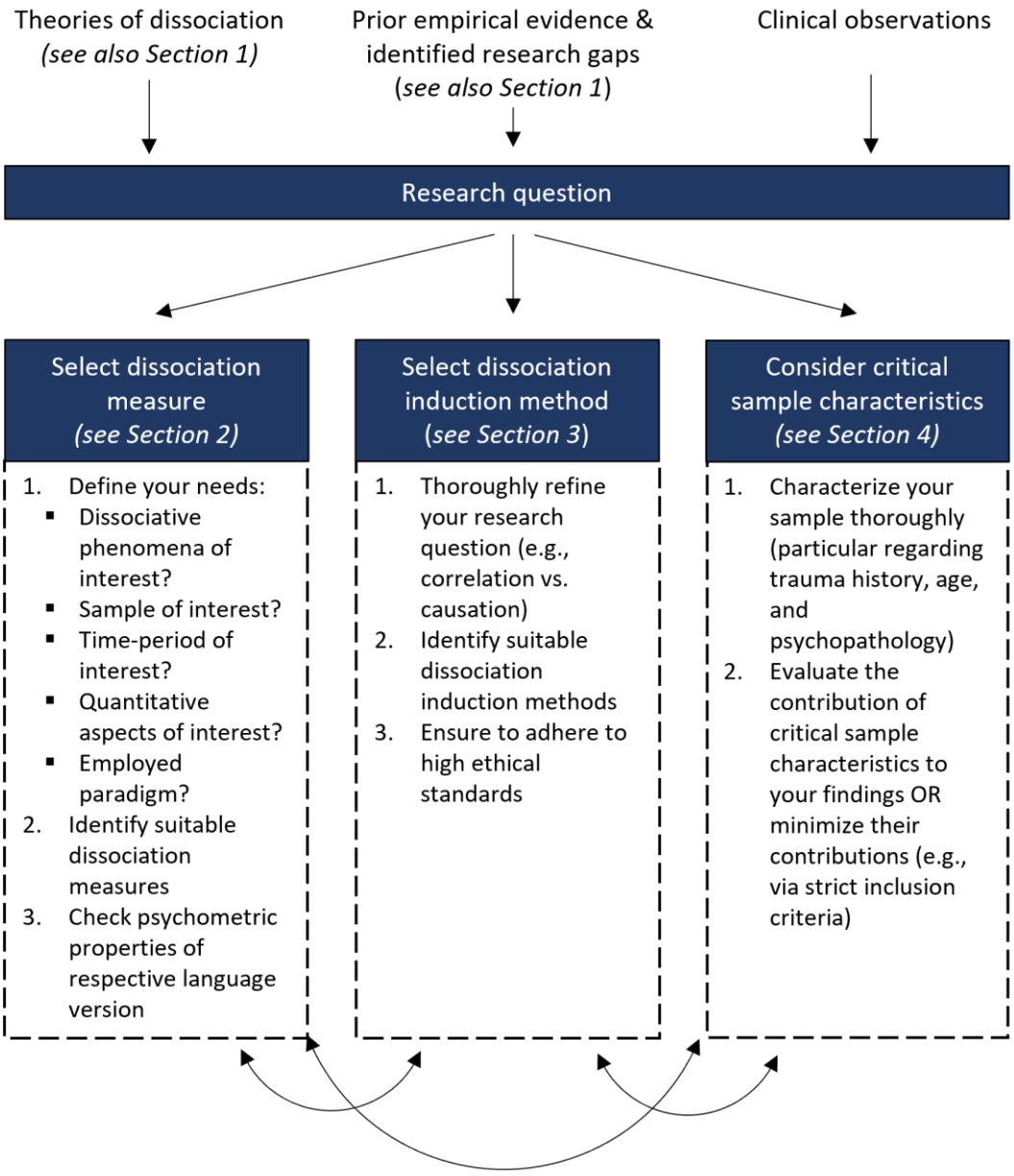
In addition, we recommend considering the contributions of these features to your findings, for instance by examining whether they moderate your findings, by replicating your findings in subsamples with more homogenous sample characteristics, or at least by discussing the potential influence of these features on your findings. Alternatively, you might also, when planning your study, consider investigating effects of several factors in conjunction (e.g., effects of dissociation and trauma history; Seitz et al., 2024) or, depending on the research question at hand, only include participants with certain characteristics (e.g., childhood vs. adulthood trauma, age range). Relatedly, when employing between-group designs to compare individuals exhibiting dissociative symptoms to those without such symptoms (e.g., healthy controls or individuals without a certain disorder), it becomes challenging to isolate the role of dissociation symptoms alone. One approach to mitigate this issue might be to use trauma-exposed controls or oversample healthy controls in order to account for imbalances in respect to trauma history and, in particular, childhood maltreatment. Similarly, clinical and control groups should also be matched age-wise. Lastly, the field might also profit from using data-driven approaches (e.g., machine-learning, latent-profile analyses, network analyses) to examine the complexity and interconnectedness of sociodemographic, trauma history and clinical variables linked to dissociative experiencing.

5. Concluding remarks

Dissociative symptoms are a prevalent, transdiagnostic phenomenon altering the wellbeing and functioning of many individuals (Lyssenko et al., 2018). Yet, empirical research on dissociative symptoms has not yet converged in many areas (e.g., neurobiological correlates, effects on treatment outcome), highlighting the need to raise and harmonize standards in dissociation research. Here, we have provided a methodological primer (for an overview see Figure 1) which might assist researchers in conducting research in the field of trauma-related dissociation by providing guidelines on dissociation assessment (*Section 2*), dissociation provocation in the laboratory (*Section 3*), and considering critical sample characteristics (*Section 4*). Further, the replication crisis in fMRI (Button et al., 2013; Cremers et al., 2017) underscores the importance of (funding) appropriate sample sizes and replication studies, detailed preregistration, and transparent reporting and publication (of null findings). Sample size limitations reported in most reviewed articles hinder statistical power, highlighting the necessity of multi-center collaborations and data merging initiatives (for instance, the *ENIGMA* working group, enigma.ini.usc.edu/ongoing/enigma-dissociation-working-group, and the early career researcher network *DIS.connected*, https://disconnected-network.com).

Figure 1

Schematic overview of critical methodological decisions in dissociation research



From both clinical and societal standpoints, ongoing investigation of (trauma-related) dissociative symptoms is crucial. Dissociative symptoms are often overlooked, yet a wide-spread phenomenon prominent in both clinical and non-clinical samples (Kate et al., 2020; Lyssenko et al., 2018). They have been associated to elevated self-harm and suicidality (Černis et al., 2019; Foote et al., 2008), and individuals with dissociative disorders are often misdiagnosed and undergo lengthy hospitalizations (Brand et al., 2012; Nester et al., 2022; Reinders et al., 2019). Further, dissociative experiencing, especially in its more severe expressions, is a phenomenon that has attracted the interest of the general population consuming topic-related books, movies, series, or social media accounts on Youtube, Instagram, or TikTok. While public education and discussion on dissociation may increase sensitivity, compassion, and ultimately encourage funding for clinical treatment options and

research, unnuanced media portrayal and misrepresentation may cause further stigmatization of an already isolated patient population (Snyder et al., 2024). Meanwhile, dissociation-associated debates (e.g., the so-called memory wars; Otgaar et al., 2019) in the past and present shaped public perception and reaches within the realm of jurisdiction, forensics, and lawmaking. For early career researchers choosing a field of interest, heated scientific and public debates centered around the topic of dissociation may appear politically charged and intimidating. Here, connecting, discussing, and collaborating with other dissociation researchers is strongly encouraged (also see the *DIS.connected* network for early career researchers, https://disconnected-network.com/). Including several transdiagnostic and transtheoretical perspectives while making use of state-of-the-art research methods as outlined in this paper may bring further advancements and objectivity into the scientific and public dialogue and ultimately lead to a better understanding of dissociative symptoms.

6. Conflicts of interest

The authors report there are no competing interests to declare.

7. References

Addy, P.H., Garcia-Romeu, A., Metzger, M., & Wade, J. (2015). The subjective experience of acute, experimentally-induced Salvia divinorum inebriation. *Journal of Psychopharmacology*, *29*(4), 426–435. https://doi.org/10.1177/0269881115570081

Al-Shamali, H.F., Winkler, O., Talarico, F., Greenshaw, A.J., Forner, C., Zhang, Y., Vermetten, E., & Burback, L. (2022). A systematic scoping review of dissociation in borderline personality disorder and implications for research and clinical practice: Exploring the fog. *Australian & New Zealand Journal of Psychiatry*, *56*(10), 1252–1264. https://doi.org/10.1177/00048674221077029

American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders (4th ed.)*. American Psychiatric Association.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). American Psychiatric Association.

Bernier, M.-J., Hébert, M., & Collin-Vézina, D. (2013). Dissociative Symptoms Over a Year in a Sample of Sexually Abused Children. *Journal of Trauma & Dissociation*, *14*(4), 455–472. https://doi.org/10.1080/15299732.2013.769478

Bernstein, D.P., Stein, J.A., Newcomb, M.D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, *27*(2), 169–190. https://doi.org/10.1016/S0145-2134(02)00541-0

Bernstein, E.M., & Putnam, F.W. (1986). Development, Reliability, and Validity of a Dissociation Scale. *Journal of Nervous and Mental Disease*, *174*(12), 727–735. https://doi.org/10.1097/00005053-198612000-00004

Beutler, S., Mertens, Y. L., Ladner, L., Schellong, J., Croy, I., & Daniels, J.K. (2022). Trauma-related dissociation and the autonomic nervous system: a systematic literature review of psychophysiological correlates of dissociative experiencing in PTSD patients. *European Journal of Psychotraumatology*, *13*(2), 2132599. https://doi.org/10.1080/20008066.2022.2132599

Blihar, D., Delgado, E., Buryak, M., Gonzalez, M., & Waechter, R. (2020). A systematic review of the neuroanatomy of dissociative identity disorder. *European Journal of Trauma & Dissociation*, *4*(3), 100148. https://doi.org/10.1016/j.ejtd.2020.100148

Bob, P. (2003). DISSOCIATION AND NEUROSCIENCE: HISTORY AND NEW PERSPECTIVES. *International Journal of Neuroscience*, *113*(7), 903–914. https://doi.org/10.1080/00207450390220376

Boon, S. (2023). *Assessing Trauma-Related Dissociation: With the Trauma and Dissociation Symptoms Interview (TADS-I)* . Norton Publishers.

Borgmann, E., Kleindienst, N., Vocks, S., & Dyer, A.S. (2014). Standardized mirror confrontation: Body-related emotions, cognitions and level of dissociation in patients with Posttraumatic Stress Disorder after childhood sexual abuse. *Borderline Personality Disorder and Emotion Dysregulation*, *1*(1), 10. https://doi.org/10.1186/2051-6673-1-10

Boulet, C., Lopez-Castroman, J., Mouchabac, S., Olié, E., Courtet, P., Thouvenot, E., Abbar, M., & Conejero, I. (2022). Stress response in dissociation and conversion disorders: A systematic review. *Neuroscience & Biobehavioral Reviews*, *132*, 957–967. https://doi.org/10.1016/j.neubiorev.2021.10.049

Brand, B.L., Lanius, R., Vermetten, E., Loewenstein, R.J., & Spiegel, D. (2012). Where Are We Going? An Update on Assessment, Treatment, and Neurobiological Research in Dissociative Disorders as We Move Toward the *DSM-5*. *Journal of Trauma & Dissociation*, *13*(1), 9–31. https://doi.org/10.1080/15299732.2011.620687

Braun, B.G. (1988). The BASK model of dissociation. *Dissociation*, *1*(2), 16–23.

Bremner, J.D. (2014). The clinician administered dissociative states scale (CADSS): Instructions for administration. *Emory University*.

Bremner, J.D., Krystal, J.H., Putnam, F.W., Southwick, S.M., Marmar, C., Charney, D.S., & Mazure, C.M. (1998). Measurement of dissociative states with the Clinician-Administered Dissociative States Scale (CADSS). *Journal of Traumatic Stress*, *11*(1), 125–136. https://doi.org/10.1023/A:1024465317902

Briere, J. (2002). *Multiscale Dissociation Inventory (MDI)*. FL: Psychological Assessment Resources.

Brown, R.J. (2006). Different Types of "Dissociation" Have Different Psychological Mechanisms. *Journal of Trauma & Dissociation*, *7*(4), 7–28. https://doi.org/10.1300/J229v07n04_02

Bryant, R.A., Felmingham, K.L., Silove, D., Creamer, M., O'Donnell, M., & McFarlane, A.C. (2011). The association between menstrual cycle and traumatic memories. *Journal of Affective Disorders*, *131*(1–3), 398–401. https://doi.org/10.1016/j.jad.2010.10.049

Button, K.S., Ioannidis, J.P.A., Mokrysz, C., Nosek, B.A., Flint, J., Robinson, E.S.J., & Munafò, M. R. (2013). Power failure: why small sample size undermines the reliability of neuroscience. *Nature Reviews Neuroscience*, *14*(5), 365–376. https://doi.org/10.1038/nrn3475

Caputo, G.B. (2010). Apparitional Experiences of New Faces and Dissociation of Self-Identity during Mirror Gazing. *Perceptual and Motor Skills*, *110*(3_suppl), 1125–1138. https://doi.org/10.2466/pms.110.C.1125-1138

Caputo, G.B. (2015). Dissociation and hallucinations in dyads engaged through interpersonal gazing. *Psychiatry Research*, *228*(3), 659–663. https://doi.org/10.1016/j.psychres.2015.04.050

Cardeña, E. (1994). The domain of dissociation . In S. J. Lynn & J. W. Rhue (Eds.), *Dissociation: Clinical and theoretical perspectives* (pp. 15–31). Guilford Press.

Carlson, E.B., & Putnam, F.W. (1993). An update on the dissociative experiences scale. *Dissociation: Progress in the Dissociative Disorders*, *6*(1), 16–27.

Carlson, E.B., Waelde, L.C., Palmieri, P.A., Macia, K.S., Smith, S.R., & McDade-Montez, E. (2018). Development and Validation of the Dissociative Symptoms Scale. *Assessment*, *25*(1), 84–98. https://doi.org/10.1177/1073191116645904

Cavicchioli, M., Scalabrini, A., Northoff, G., Mucci, C., Ogliari, A., & Maffei, C. (2021). Dissociation and emotion regulation strategies: A meta-analytic review. *Journal of Psychiatric Research*, *143*, 370–387. https://doi.org/10.1016/j.jpsychires.2021.09.011

Černis, E., Beierl, E., Molodynski, A., Ehlers, A., & Freeman, D. (2021). A new perspective and assessment measure for common dissociative experiences: 'Felt Sense of Anomaly.' *PLOS ONE*, *16*(2), e0247037. https://doi.org/10.1371/journal.pone.0247037

Černis, E., Chan, C., & Cooper, M. (2019). What is the relationship between dissociation and self-harming behaviour in adolescents? *Clinical Psychology & Psychotherapy*, *26*(3), 328–338. https://doi.org/10.1002/cpp.2354

Chessell, Z.J., Brady, F., Akbar, S., Stevens, A., & Young, K. (2019). A protocol for managing dissociative symptoms in refugee populations. *The Cognitive Behaviour Therapist*, *12*, e27. https://doi.org/10.1017/S1754470X19000114

Chou, C.-Y., La Marca, R., Steptoe, A., & Brewin, C.R. (2014). Heart rate, startle response, and intrusive trauma memories. *Psychophysiology*, *51*(3), 236–246. https://doi.org/10.1111/psyp.12176

Cremers, H.R., Wager, T.D., & Yarkoni, T. (2017). The relation between statistical power and inference in fMRI. *PLOS ONE*, *12*(11), e0184923. https://doi.org/10.1371/journal.pone.0184923

Dalenberg, C.J., Brand, B.L., Gleaves, D.H., Dorahy, M.J., Loewenstein, R.J., Cardeña, E., Frewen, P.A., Carlson, E.B., & Spiegel, D. (2012). Evaluation of the evidence for the trauma and fantasy models of dissociation. *Psychological Bulletin*, *138*(3), 550–588. https://doi.org/10.1037/a0027447

Dalenberg, C.J., Coe, M.T., Reto, C.S., Aransky, K.M., Duvenage, C., & Weber, R. (1994). The development of a measure of dissociation for use on general psychiatric and nonpsychiatric populations. *Paper Presented at the Eighth Annual Conference on Responding to Child Maltreatment, San Diego, California.*

Danböck, S.K., Duek, O., Ben-Zion, Z., Korem, N., Amen, S.L., Kelmendi, B., Wilhelm, F.H., Levy, I., & Harpaz-Rotem, I. (2024). Effects of a dissociative drug on fronto-limbic resting-state functional connectivity in individuals with posttraumatic stress disorder: a randomized controlled pilot study. *Psychopharmacology*, *241*, 243–252. https://doi.org/10.1007/s00213-023-06479-4

Danböck, S.K., Franke, L.K., Miedl, S.F., Liedlgruber, M., Bürkner, P.-C., & Wilhelm, F.H. (2023). Experimental induction of peritraumatic dissociation: The role of negative affect and pain and their psychophysiological and neural correlates. *Behaviour Research and Therapy*, *164*, 104289. https://doi.org/10.1016/j.brat.2023.104289

Danböck, S.K., Hettegger, S.E., Anders, S., Franke, L.K., Liedlgruber, M., Miedl, S.F., Gashi, A., Kurapov, A., Weber, R.-C., Ehring, T., & Wilhelm, F.H. (2023). Psychometric properties of the dissociative subtype of posttraumatic stress disorder scale: replication and extension in two German-speaking samples. *European Journal of Psychotraumatology*, *14*(2), 2238492. https://doi.org/10.1080/20008066.2023.2238492

Danböck, S.K., Hettegger, S.K., Franke, L.K., Hillemeyer, K., Liedlgruber, M., Miedl, S.F., Alpers, G.W., & Wilhelm, F.H. (in prep.). Comparing methods to induce dissociation during trauma films: Differences in dissociation intensity and quality as well as effects on intrusions and memory.

Danböck, S.K., Liedlgruber, M., Franke, L.K., Miedl, S.F., Hettegger, S.E., Weber, R.-C., & Wilhelm, F.H. (2024). Acute dissociation as part of the defense cascade: Associations with behavioral, autonomic, and experiential threat responses in posttraumatic stress disorder. *Journal of Psychopathology and Clinical Science*, *133*(1), 76–89. https://doi.org/10.1037/abn0000873

Danböck, S.K., Rattel, J.A., Franke, L.K., Liedlgruber, M., Miedl, S.F., & Wilhelm, F.H. (2021). Peritraumatic dissociation revisited: associations with autonomic activation, facial movements, staring, and intrusion formation. *European Journal of Psychotraumatology*, *12*(1), 1991609. https://doi.org/10.1080/20008198.2021.1991609

Danese, A. (2020). Annual Research Review: Rethinking childhood trauma-new research directions for measurement, study design and analytical strategies. *Journal of Child Psychology and Psychiatry*, *61*(3), 236–250. https://doi.org/10.1111/jcpp.13160

Dehestani, S., Mohammadpour, A.H., Sadjadi, S.A., Sathyapalan, T., & Sahebkar, A. (2022). Clinical use of ketamine in psychiatric disorders. *Annales Médico-Psychologiques, Revue Psychiatrique*. https://doi.org/10.1016/j.amp.2022.05.008

Dell, P.F. (2006). The Multidimensional Inventory of Dissociation (MID): A Comprehensive Measure of Pathological Dissociation. *Journal of Trauma & Dissociation*, *7*(2), 77–106. https://doi.org/10.1300/J229v07n02_06

Dell, P.F. (2017). Is high hypnotizability a necessary diathesis for pathological dissociation? *Journal of Trauma & Dissociation*, *18*(1), 58–87. https://doi.org/10.1080/15299732.2016.1191579

Dorahy, M.J., Peck, R.K., & Huntjens, R.J.C. (2016). The impact of dissociation on perceptual priming and intrusions after listening to auditory narratives. *Journal of Trauma & Dissociation*, *17*(4), 410–425. https://doi.org/10.1080/15299732.2015.1134746

Duek, O., Kelmendi, B., Pietrzak, R.H., & Harpaz-Rotem, I. (2019). Augmenting the Treatment of PTSD with Ketamine—a Review. *Current Treatment Options in Psychiatry*, *6*(2), 143–153. https://doi.org/10.1007/s40501-019-00172-0

Eidhof, M.B., ter Heide, F.J.J., van Der Aa, N., Schreckenbach, M., Schmidt, U., Brand, B.L., Lanius, R.A., Loewenstein, R.J., Spiegel, D., & Vermetten, E. (2019). The Dissociative Subtype of PTSD Interview (DSP-I): Development and Psychometric Properties. *Journal of Trauma & Dissociation*, *20*(5), 564–581. https://doi.org/10.1080/15299732.2019.1597806

Elzinga, B.M., Bermond, B., & van Dyck, R. (2002). The Relationship between Dissociative Proneness and Alexithymia. *Psychotherapy and Psychosomatics*, *71*(2), 104–111. https://doi.org/10.1159/000049353

Espirito Santo, H., & Luís Pio-Abreu, J. (2008). Demographic and Mental Health Factors Associated with Pathological Dissociation in a Portuguese Sample. *Journal of Trauma & Dissociation*, *9*(3), 369–387. https://doi.org/10.1080/15299730802139238

Foote, B., Smolin, Y., Neft, D.I., & Lipschitz, D. (2008). Dissociative Disorders and Suicidality in Psychiatric Outpatients. *Journal of Nervous & Mental Disease*, *196*(1), 29–36. https://doi.org/10.1097/NMD.0b013e31815fa4e7

Frewen, P.A., & Lanius, R.A. (2014). Trauma-Related Altered States of Consciousness: Exploring the 4-D Model. *Journal of Trauma & Dissociation*, *15*(4), 436–456. https://doi.org/10.1080/15299732.2013.873377

Frewen, P.A., Zhu, J., & Lanius, R. (2019). Lifetime traumatic stressors and adverse childhood experiences uniquely predict concurrent PTSD, complex PTSD, and dissociative subtype of PTSD

symptoms whereas recent adult non-traumatic stressors do not: results from an online survey study. *European Journal of Psychotraumatology*, *10*(1). https://doi.org/10.1080/20008198.2019.1606625

Gadeberg, A.K., Montgomery, E., Frederiksen, H.W., & Norredam, M. (2017). Assessing trauma and mental health in refugee children and youth: a systematic review of validated screening and measurement tools. *European Journal of Public Health*, *27*(3), 439–446. https://doi.org/10.1093/eurpub/ckx034

Giesbrecht, T., Lynn, S.J., Lilienfeld, S.O., & Merckelbach, H. (2008). Cognitive processes in dissociation: An analysis of core theoretical assumptions. *Psychological Bulletin*, *134*(5), 617–647. https://doi.org/10.1037/0033-2909.134.5.617

Giesbrecht, T., Smeets, T., Leppink, J., Jelicic, M., & Merckelbach, H. (2007). Acute dissociation after 1 night of sleep loss. *Journal of Abnormal Psychology*, *116*(3), 599–606. https://doi.org/10.1037/0021-843X.116.3.599

Giesbrecht, T., Smeets, T., & Merckelbach, H. (2008). Dissociative experiences on ice — Peritraumatic and trait dissociation during the cold pressor test. *Psychiatry Research*, *157*(1–3), 115–121. https://doi.org/10.1016/j.psychres.2006.12.012

Gómez-Pérez, L., López-Martínez, A.E., & Asmundson, G.J.G. (2013). Predictors of trait dissociation and peritraumatic dissociation induced via cold pressor. *Psychiatry Research*, *210*(1), 274–280. https://doi.org/10.1016/j.psychres.2013.06.001

Griffin, M.G., Resick, P.A., & Mechanic, M.B. (1997). Objective assessment of peritraumatic dissociation: psychophysiological indicators. *The American Journal of Psychiatry*, *154*(8), 1081–1088. https://doi.org/10.1176/ajp.154.8.1081

Guetta, R.E., Wilcox, E.S., Stoop, T.B., Maniates, H., Ryabchenko, K.A., Miller, M.W., & Wolf, E.J. (2019). Psychometric Properties of the Dissociative Subtype of PTSD Scale: Replication and Extension in a Clinical Sample of Trauma-Exposed Veterans. *Behavior Therapy*, *50*(5), 952–966. https://doi.org/10.1016/j.beth.2019.02.003

Hagenaars, M.A., van Minnen, A., Holmes, E.A., Brewin, C.R., & Hoogduin, K.A.L. (2008). The effect of hypnotically induced somatoform dissociation on the development of intrusions after an aversive film. *Cognition and Emotion*, *22*(5), 944–963. https://doi.org/10.1080/02699930701575151

Herzog, S., Fogle, B.M., Harpaz-Rotem, I., Tsai, J., & Pietrzak, R.H. (2020). Dissociative Symptoms in a Nationally Representative Sample of Trauma-Exposed U.S. Military Veterans: Prevalence, Comorbidities, and Suicidality. *Journal of Affective Disorders*, *272*, 138–145. https://doi.org/10.1016/j.jad.2020.03.177

Hoeboer, C.M., De Kleine, R.A., Molendijk, M.L., Schoorl, M., Oprel, D.A.C., Mouthaan, J., Van der Does, W., & Van Minnen, A. (2020). Impact of dissociation on the effectiveness of psychotherapy for post-traumatic stress disorder: meta-analysis. *BJPsych Open*, *6*(3), e53. https://doi.org/10.1192/bjo.2020.30

Holmes, E.A., Brewin, C.R., & Hennessy, R.G. (2004). Trauma Films, Information Processing, and Intrusive Memory Development. *Journal of Experimental Psychology: General*, *133*(1), 3–22. https://doi.org/10.1037/0096-3445.133.1.3

Holmes, E.A., Brown, R., Mansell, W., Fearon, R., Hunter, E., Frasquilho, F., & Oakley, D. (2005). Are there two qualitatively distinct forms of dissociation? A review and some clinical implications. *Clinical Psychology Review*, *25*(1), 1–23. https://doi.org/10.1016/j.cpr.2004.08.006

Holmes, E.A., Oakley, D.A., Stuart, A.D.P., & Brewin, C.R. (2006). Investigating Peri-Traumatic Dissociation Using Hypnosis During a Traumatic Film. *Journal of Trauma & Dissociation*, *7*(4), 91–113. https://doi.org/10.1300/J229v07n04_06

Hopper, J.W., Frewen, P.A., Sack, M., Lanius, R.A., & van der Kolk, B.A. (2007). The Responses to Script-Driven Imagery Scale (RSDI): Assessment of State Posttraumatic Symptoms for Psychobiological and Treatment Research. *Journal of Psychopathology and Behavioral Assessment*, *29*(4), 249–268. https://doi.org/10.1007/s10862-007-9046-0

Hopper, J.W., Frewen, P.A., van der Kolk, B.A., & Lanius, R.A. (2007). Neural correlates of reexperiencing, avoidance, and dissociation in PTSD: Symptom dimensions and emotion dysregulation in responses to script-driven trauma imagery. *Journal of Traumatic Stress*, *20*(5), 713–725. https://doi.org/10.1002/jts.20284

Horowitz, J.D., & Telch, M.J. (2007). Dissociation and pain perception: an experimental investigation. *Journal of Traumatic Stress*, *20*(4), 597–609. https://doi.org/10.1002/jts.20226

Huntjens, R.J.C., Janssen, G.P.J., Merckelbach, H., & Lynn, S.J. (2021). The link between dissociative tendencies and hyperassociativity. *Journal of Behavior Therapy and Experimental Psychiatry*, *73*, 101665. https://doi.org/10.1016/j.jbtep.2021.101665

Irish, L.A., Fischer, B., Fallon, W., Spoonster, E., Sledjeski, E.M., & Delahanty, D.L. (2011). Gender differences in PTSD symptoms: An exploration of peritraumatic mechanisms. *Journal of Anxiety Disorders*, *25*(2), 209–216. https://doi.org/10.1016/j.janxdis.2010.09.004

James, E.L., Lau-Zhu, A., Clark, I.A., Visser, R.M., Hagenaars, M.A., & Holmes, E.A. (2016). The trauma film paradigm as an experimental psychopathology model of psychological trauma: intrusive memories and beyond. *Clinical Psychology Review*, *47*, 106–142. https://doi.org/10.1016/j.cpr.2016.04.010

Kate, M.A., Hopwood, T., & Jamieson, G. (2020). The prevalence of Dissociative Disorders and dissociative experiences in college populations: a meta-analysis of 98 studies. *Journal of Trauma & Dissociation*, *21*(1), 16–61. https://doi.org/10.1080/15299732.2019.1647915

Kerr, D.M., McDonald, J., & Minnis, H. (2021). The association of child maltreatment and systemic inflammation in adulthood: A systematic review. *PLOS ONE*, *16*(4), e0243685. https://doi.org/10.1371/journal.pone.0243685

Kindt, M., Van den Hout, M., & Buck, N. (2005). Dissociation related to subjective memory fragmentation and intrusions but not to objective memory disturbances. *Journal of Behavior Therapy and Experimental Psychiatry*, *36*(1), 43–59. https://doi.org/10.1016/J.JBTEP.2004.11.005

Korzekwa, M.I., Dell, P.F., Links, P.S., Thabane, L., & Fougere, P. (2009). Dissociation in Borderline Personality Disorder: A Detailed Look. *Journal of Trauma & Dissociation*, *10*(3), 346–367. https://doi.org/10.1080/15299730902956838

Kouri, N., D'Andrea, W., Brown, A.D., & Siegle, G.J. (2023). Shame-induced dissociation: An experimental study of experiential avoidance. *Psychological Trauma: Theory, Research, Practice, and Policy*, *15*(4), 547–556. https://doi.org/10.1037/tra0001428

Kozlowska, K., Walker, P., McLean, L., & Carrive, P. (2015). Fear and the Defense Cascade. *Harvard Review of Psychiatry*, *23*(4), 263–287. https://doi.org/10.1097/HRP.0000000000000065

Krause-Utz, A. (2022). Dissociation, trauma, and borderline personality disorder. *Borderline Personality Disorder and Emotion Dysregulation*, *9*(1), 14. https://doi.org/10.1186/s40479-022-00184-y

Krause-Utz, A., Frost, R., Chatzaki, E., Winter, D., Schmahl, C., & Elzinga, B.M. (2021). Dissociation in Borderline Personality Disorder: Recent Experimental, Neurobiological Studies, and Implications for Future Research and Treatment. *Current Psychiatry Reports*, *23*(6), 37. https://doi.org/10.1007/s11920-021-01246-8

Krüger, C. (2020). Culture, trauma and dissociation: A broadening perspective for our field. *Journal of Trauma & Dissociation*, *21*(1), 1–13. https://doi.org/10.1080/15299732.2020.1675134

Krüger, C., & Mace, C. J. (2002). Psychometric validation of the State Scale of Dissociation (SSD). *Psychology and Psychotherapy: Theory, Research and Practice*, *75*(1), 33–51.

Krystal, J.H. (1994). Subanesthetic Effects of the Noncompetitive NMDA Antagonist, Ketamine, in Humans. *Archives of General Psychiatry*, *51*(3), 199. https://doi.org/10.1001/archpsyc.1994.03950030035004

Lanius, R.A., Boyd, J.E., McKinnon, M.C., Nicholson, A.A., Frewen, P.A., Vermetten, E., Jetly, R., & Spiegel, D. (2018). A Review of the Neurobiological Basis of Trauma-Related Dissociation and Its Relation to Cannabinoid- and Opioid-Mediated Stress Response: a Transdiagnostic,

Translational Approach. *Current Psychiatry Reports*, *20*(12), 118. https://doi.org/10.1007/s11920-018-0983-y

Lanius, R.A., Brand, B., Vermetten, E., Frewen, P.A., & Spiegel, D. (2012). The dissociative subtype of posttraumatic stress disorder: Rationale, clinical and neurobiological evidence, and implications. *Depression and Anxiety*, *29*(8), 701–708. https://doi.org/10.1002/da.21889

Lanius, R.A., Vermetten, E., Loewenstein, R.J., Brand, B., Schmahl, C., Bremner, J.D., & Spiegel, D. (2010). Emotion Modulation in PTSD: Clinical and Neurobiological Evidence for a Dissociative Subtype. *American Journal of Psychiatry*, *167*(6), 640–647. https://doi.org/10.1176/appi.ajp.2009.09081168

Lebois, L.A.M., Kumar, P., Palermo, C.A., Lambros, A.M., O'Connor, L., Wolff, J.D., Baker, J.T., Gruber, S.A., Lewis-Schroeder, N., Ressler, K.J., Robinson, M.A., Winternitz, S., Nickerson, L.D., & Kaufman, M.L. (2022). Deconstructing dissociation: a triple network model of trauma-related dissociation and its subtypes. *Neuropsychopharmacology*, *47*(13), 2261–2270. https://doi.org/10.1038/s41386-022-01468-1

Lee, H.S., Min, D., Baik, S.Y., Kwon, A., Jin, M.J., & Lee, S.-H. (2022). Association between Dissociative Symptoms and Morning Cortisol Levels in Patients with Post-traumatic Stress Disorder. *Clinical Psychopharmacology and Neuroscience*, *20*(2), 292–299. https://doi.org/10.9758/cpn.2022.20.2.292

Leonard, K.N., Telch, M.J., & Harrington, P.J. (1999). Dissociation in the laboratory: A comparison of strategies. *Behaviour Research and Therapy*, *37*(1), 49–61. https://doi.org/10.1016/S0005-7967(98)00072-2

Lickel, J., Nelson, E., Lickel, A.H., & Deacon, B. (2008). Interoceptive Exposure Exercises for Evoking Depersonalization and Derealization: A Pilot Study. *Journal of Cognitive Psychotherapy*, *22*(4), 321–330. https://doi.org/10.1891/0889-8391.22.4.321

Lotfinia, S., Soorgi, Z., Mertens, Y., & Daniels, J. (2020). Structural and functional brain alterations in psychiatric patients with dissociative experiences: A systematic review of magnetic resonance imaging studies. *Journal of Psychiatric Research*, *128*, 5–15. https://doi.org/10.1016/j.jpsychires.2020.05.006

Lyssenko, L., Schmahl, C., Bockhacker, L., Vonderlin, R., Bohus, M., & Kleindienst, N. (2018). Dissociation in psychiatric disorders: A meta-analysis of studies using the dissociative experiences scale. *American Journal of Psychiatry*, *175*(1). https://doi.org/10.1176/appi.ajp.2017.17010025

Maaranen, P., Tanskanen, A., Honkalampi, K., Haatainen, K., Hintikka, J., & Viinamäki, H. (2005). Factors Associated with Pathological Dissociation in the General Population. *Australian & New*

Zealand Journal of Psychiatry, *39*(5), 387–394. https://doi.org/10.1080/j.1440-1614.2005.01586.x

Macia, K.S., Carlson, E.B., Palmieri, P.A., Smith, S.R., Anglin, D.M., Ghosh Ippen, C., Lieberman, A.F., Wong, E.C., Schell, T.L., & Waelde, L.C. (2023). Development of a Brief Version of the Dissociative Symptoms Scale and the Reliability and Validity of DSS-B Scores in Diverse Clinical and Community Samples. *Assessment*, *30*(7), 2058–2073. https://doi.org/10.1177/10731911221133317

Marmar, C.R., Weiss, D.S., & Metzler, T.J. (1997). The Peritraumatic Dissociative Experiences Questionnaire. In J.P. Wilson & T.M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 412–428). Guilford Press.

Merckelbach, H., Otgaar, H., & Lynn, S.J. (2022). Empirical research on fantasy proneness and its correlates 2000–2018: A meta-analysis. *Psychology of Consciousness: Theory, Research, and Practice*, *9*(1), 2–26. https://doi.org/10.1037/cns0000272

Mertens, Y.L., & Daniels, J.K. (2022). The Clinician-Administered Dissociative States Scale (CADSS): Validation of the German Version. *Journal of Trauma & Dissociation*, *23*(4), 366–384. https://doi.org/10.1080/15299732.2021.1989111

Mertens, Y.L., Manthey, A., Sierk, A., de Jong, P., Walter, H., & Daniels, J.K. (2023). A pharmacological challenge paradigm to assess neural signatures of script-elicited acute dissociation in women with post-traumatic stress disorder. *BJPsych Open*, *9*(3), e78. https://doi.org/10.1192/bjo.2023.34

Mertens, Y.L., Manthey, A., Sierk, A., Walter, H., & Daniels, J.K. (2022). Neural correlates of acute post-traumatic dissociation: a functional neuroimaging script-driven imagery study. *BJPsych Open*, *8*(4), e109. https://doi.org/DOI: 10.1192/bjo.2022.65

Michal, M., Roder, C., Mayer, J., Lengler, U., & Krakow, K. (2007). Spontaneous dissociation during functional MRI experiments. *Journal of Psychiatric Research*, *41*(1–2), 69–73. https://doi.org/10.1016/j.jpsychires.2005.04.011

Michal, M., Zwerenz, R., Tschan, R., Edinger, J., Lichy, M., Knebel, A., Tuin, I., & Beutel, M. (2010). Screening nach Depersonalisation-Derealisation mittels zweier Items der Cambridge Depersonalisation Scale. *PPmP - Psychotherapie · Psychosomatik · Medizinische Psychologie*, *60*(05), 175–179. https://doi.org/10.1055/s-0029-1224098

Miller, P.P., Brown, T.A., DiNardo, P.A., & Barlow, D.H. (1994). The experimental induction of depersonalization and derealization in panic disorder and nonanxious subjects. *Behaviour Research and Therapy*, *32*(5), 511–519. https://doi.org/https://doi.org/10.1016/0005-7967(94)90138-4

Mobbs, D., Marchant, J.L., Hassabis, D., Seymour, B., Tan, G., Gray, M., Petrovic, P., Dolan, R.J., & Frith, C.D. (2009). From Threat to Fear: The Neural Organization of Defensive Fear Systems in Humans. *The Journal of Neuroscience*, *29*(39), 12236–12243. https://doi.org/10.1523/JNEUROSCI.2378-09.2009

Murray, J. (1997). *The Role of Dissociation in the Development and Maintenance of Post-Traumatic Stress Disorder* [Unpublished Ph.D. thesis]. University of Oxford.

Murray, J., Ehlers, A., & Mayou, R.A. (2002). Dissociation and post-traumatic stress disorder: two prospective studies of road traffic accident survivors. *British Journal of Psychiatry*, *180*(4), 363–368. https://doi.org/10.1192/bjp.180.4.363

Nester, M.S., Hawkins, S.L., & Brand, B.L. (2022). Barriers to accessing and continuing mental health treatment among individuals with dissociative symptoms. *European Journal of Psychotraumatology*, *13*(1). https://doi.org/10.1080/20008198.2022.2031594

Niciu, M.J., Shovestul, B.J., Jaso, B.A., Farmer, C., Luckenbaugh, D.A., Brutsche, N.E., Park, L.T., Ballard, E.D., & Zarate, C.A. (2018). Features of dissociation differentially predict antidepressant response to ketamine in treatment-resistant depression. *Journal of Affective Disorders*, *232*, 310–315. https://doi.org/10.1016/j.jad.2018.02.049

Nijenhuis, E.R.S. (2010). The Scoring and Interpretation of the SDQ-20 and SDQ-5. *Activitas Nervosa Superior*, *52*(1), 24–28. https://doi.org/10.1007/BF03379561

Nijenhuis, E.R.S., Spinhoven, P., Van Dyck, R., Van Der Hart, O., & Vanderlinden, J. (1996). The Development and Psychometric Characteristics of the Somatoform Dissociation Questionnaire (SDQ-20). *The Journal of Nervous and Mental Disease*, *184*(11), 688–694. https://doi.org/10.1097/00005053-199611000-00006

Nijenhuis, E.R.S., & van der Hart, O. (2011). Dissociation in trauma: a new definition and comparison with previous formulations. *Journal of Trauma & Dissociation*, *12*(4), 416–445. https://doi.org/10.1080/15299732.2011.570592

Nijenhuis, E.R.S., van der Hart, O., & Steele, K. (2010). Trauma-related structural dissociation of the personality. *Activitas Nervosa Superior*, *52*(1), 1–23. https://doi.org/10.1007/BF03379560/METRICS

Otgaar, H., Howe, M.L., Patihis, L., Merckelbach, H., Lynn, S.J., Lilienfeld, S.O., & Loftus, E.F. (2019). The Return of the Repressed: The Persistent and Problematic Claims of Long-Forgotten Trauma. *Perspectives on Psychological Science*, *14*(6), 1072–1095. https://doi.org/10.1177/1745691619862306

Piazza, G.G., Iskandar, G., Hennessy, V., Zhao, H., Walsh, K., McDonnell, J., Terhune, D.B., Das, R.K., & Kamboj, S.K. (2022). Pharmacological modelling of dissociation and psychosis: an evaluation of the Clinician Administered Dissociative States Scale and Psychotomimetic States Inventory

during nitrous oxide ('laughing gas')-induced anomalous states. *Psychopharmacology*, *239*(7), 2317–2329. https://doi.org/10.1007/s00213-022-06121-9

Pole, N. (2007). The psychophysiology of posttraumatic stress disorder: A meta-analysis. *Psychological Bulletin*, *133*(5), 725–746. https://doi.org/10.1037/0033-2909.133.5.725

Porter, C.A., Mayanil, T., Gupta, T., & Horton, L.E. (2024). #DID: The Role of Social Media in the Presentation of Dissociative Symptoms in Adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, *63*(2), 101–104. https://doi.org/10.1016/j.jaac.2023.03.021

Punamäki, R.-L., Komproe, I.H., Qouta, S., Elmasri, M., & de Jong, J.T.V.M. (2005). The Role of Peritraumatic Dissociation and Gender in the Association Between Trauma and Mental Health in a Palestinian Community Sample. *American Journal of Psychiatry*, *162*(3), 545–551. https://doi.org/10.1176/appi.ajp.162.3.545

Reinders, A.A.T.S., Marquand, A.F., Schlumpf, Y.R., Chalavi, S., Vissia, E.M., Nijenhuis, E.R.S., Dazzan, P., Jäncke, L., & Veltman, D.J. (2019). Aiding the diagnosis of dissociative identity disorder: pattern recognition study of brain biomarkers. *British Journal of Psychiatry*, *215*(3), 536–544. https://doi.org/10.1192/bjp.2018.255

Renard, S.B., Huntjens, R.J.C., & Pijnenborg, G.H.M. (2018). Inducing dissociation and schizotypal experiences through "vision-deforming" glasses. *Consciousness and Cognition*, *65*, 209–215. https://doi.org/10.1016/j.concog.2018.06.019

Rodrigues, N.B., McIntyre, R.S., Lipsitz, O., Lee, Y., Cha, D.S., Shekotikhina, M., Vinberg, M., Gill, H., Subramaniapillai, M., Kratiuk, K., Lin, K., Ho, R., Mansur, R.B., & Rosenblat, J.D. (2021). A simplified 6-Item clinician administered dissociative symptom scale (CADSS-6) for monitoring dissociative effects of sub-anesthetic ketamine infusions. *Journal of Affective Disorders*, *282*, 160–164. https://doi.org/10.1016/j.jad.2020.12.119

Roeser, K., Obergfell, F., Meule, A., Vögele, C., Schlarb, A.A., & Kübler, A. (2012). Of larks and hearts — morningness/eveningness, heart rate variability and cardiovascular stress response at different times of day. *Physiology & Behavior*, *106*(2), 151–157. https://doi.org/10.1016/j.physbeh.2012.01.023

Roydeva, M.I., & Reinders, A.A.T.S. (2021). Biomarkers of Pathological Dissociation: A Systematic Review. *Neuroscience & Biobehavioral Reviews*, *123*, 120–202. https://doi.org/10.1016/j.neubiorev.2020.11.019

Sack, M., Cillien, M., & Hopper, J.W. (2012). Acute dissociation and cardiac reactivity to script-driven imagery in trauma-related disorders. *European Journal of Psychotraumatology*, *3*(1), 17419. https://doi.org/10.3402/ejpt.v3i0.17419

Sar, V., & Ross, C. (2023). A Research Agenda for the Dissociative Disorders Field. . In M. J. Dorahy, S. N. Gold, & J. A. O'Neil (Eds.), *Dissociation and the Dissociative Disorders; Past, Present, Future.* (2nd ed., pp. 793–810). Routledge .

Sayar, K., Kose, S., Grabe, H.J., & Topbas, M. (2005). Alexithymia and dissociative tendencies in an adolescent sample from Eastern Turkey. *Psychiatry and Clinical Neurosciences*, *59*(2), 127–134. https://doi.org/10.1111/j.1440-1819.2005.01346.x

Schäflein, E., Sattel, H., Schmidt, U., & Sack, M. (2018). The enemy in the mirror: self-perception-induced stress results in dissociation of psychological and physiological responses in patients with dissociative disorder. *European Journal of Psychotraumatology*, *9*(sup3), 1472991. https://doi.org/10.1080/20008198.2018.1472991

Schalinski, I., Breinlinger, S., Hirt, V., Teicher, M.H., Odenwald, M., & Rockstroh, B. (2019). Environmental adversities and psychotic symptoms: The impact of timing of trauma, abuse, and neglect. *Schizophrenia Research*, *205*, 4–9. https://doi.org/10.1016/j.schres.2017.10.034

Schalinski, I., Schauer, M., & Elbert, T. (2015). The Shutdown Dissociation Scale (Shut-D). *European Journal of Psychotraumatology*, *6*(1), 25652. https://doi.org/10.3402/ejpt.v6.25652

Schauer, M., & Elbert, T. (2010). Dissociation Following Traumatic Stress. *Zeitschrift Für Psychologie / Journal of Psychology*, *218*(2), 109–127. https://doi.org/10.1027/0044-3409/a000018

Seedat, S., Stein, M.B., & Forde, D.R. (2003). PREVALENCE OF DISSOCIATIVE EXPERIENCES IN A COMMUNITY SAMPLE. *The Journal of Nervous and Mental Disease*, *191*(2), 115–120. https://doi.org/10.1097/01.NMD.0000050940.16782.6B

Seitz, K.I., Sicorello, M., Schmitz, M., Valencia, N., Herpertz, S.C., Bertsch, K., & Neukel, C. (2024). Childhood maltreatment and amygdala response to interpersonal threat in a transdiagnostic adult sample: The role of trait dissociation. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*. https://doi.org/10.1016/j.bpsc.2024.01.003

Shin, G.I., Goldstein, L.H., & Pick, S. (2019). Evidence for subjective emotional numbing following induced acute dissociation. *Behaviour Research and Therapy*, *119*, 103407. https://doi.org/10.1016/j.brat.2019.05.004

Short, B., Fong, J., Galvez, V., Shelker, W., & Loo, C.K. (2018). Side-effects associated with ketamine use in depression: a systematic review. *The Lancet Psychiatry*, *5*(1), 65–78. https://doi.org/10.1016/S2215-0366(17)30272-9

Sierra, M., & Berrios, G.E. (1998). Depersonalization: neurobiological perspectives. *Biological Psychiatry*, *44*(9), 898–908. https://doi.org/10.1016/S0006-3223(98)00015-8

Sierra, M., & Berrios, G.E. (2000). The Cambridge Depersonalisation Scale: A new instrument for the measurement of depersonalisation. *Psychiatry Research*, *93*(2), 153–164.

Snyder, B.L., Boyer, S. M., Caplan, J.E., Nester, M.S., & Brand, B. (2024). It's not just a movie: Perceived impact of misportrayals of dissociative identity disorder in the media on self and treatment. *European Journal of Trauma & Dissociation*, *8*(3), 100429. https://doi.org/10.1016/j.ejtd.2024.100429

Spitzer, C., Barnow, S., Grabe, H.J., Klauer, T., Schneider, W., Freyberger, H.J., & Stieglitz, R.-D. (2006). Frequency, Clinical and Demographic Correlates of Pathological Dissociation in Europe. *Journal of Trauma & Dissociation*, *7*(1), 51–62. https://doi.org/10.1300/J229v07n01_05

Spitzer, C., Klauer, T., Grabe, H.-J., Lucht, M., Stieglitz, R.-D., Schneider, W., & Freyberger, H.J. (2003). Gender Differences in Dissociation. *Psychopathology*, *36*(2), 65–70. https://doi.org/10.1159/000070360

Spitzer, C., Mestel, R., Klingelhöfer, J., Gänsicke, M., & Freyberger, H.J. (2004). Screening und Veränderungsmessung dissoziativer Psychopathologie: Psychometrische Charakteristika der Kurzform des Fragebogens zu dissoziativen Symptomen (FDS-20). *PPmP - Psychotherapie · Psychosomatik · Medizinische Psychologie*, *54*(3/4), 165–172. https://doi.org/10.1055/s-2003-814783

Steinberg, M. (1993). *Structured Clinical Interview for DSM-IV Dissociative Disorders (SCID-D)*. American Psychiatric Press.

Steinberg, M. (1994). *Interviewer's guide to the structured clinical interview for DSM-IV dissociative disorders (SCID-D) (rev. ed.)*. American Psychiatric Press.

Stiglmayr, C.E., Braakmann, D., Haaf, B., Stieglitz, R.D., & Bohus, M. (2003). Entwicklung und psychometrische Charakteristika der Dissoziations-Spannungs-Skala akut (DSS-akut) [Development and Characteristics of Dissociation-Tension-Scale Acute (DSS-Akute)]. *PPmP - Psychotherapie · Psychosomatik · Medizinische Psychologie*, *53*(7), 287–294. https://doi.org/10.1055/s-2003-40495

Stiglmayr, C., Schimke, P., Wagner, T., Braakmann, D., Schweiger, U., Sipos, V., Fydrich, T., Schmahl, C., Ebner-Priemer, U., Kleindienst, N., Bischkopf, J., Auckenthaler, A., & Kienast, T. (2010). Development and Psychometric Characteristics of the Dissociation Tension Scale. *Journal of Personality Assessment*, *92*(3), 269–277. https://doi.org/10.1080/00223891003670232

Stiglmayr, C., Schmahl, C., Bremner, J.D., Bohus, M., & Ebner-Priemer, U. (2009). Development and Psychometric Characteristics of the DSS-4 as a Short Instrument to Assess Dissociative Experience during Neuropsychological Experiments. *Psychopathology*, *42*(6), 370–374. https://doi.org/10.1159/000236908

Teicher, M.H., Gordon, J.B., & Nemeroff, C.B. (2022). Recognizing the importance of childhood maltreatment as a critical factor in psychiatric diagnoses, treatment, research, prevention, and

education. *Molecular Psychiatry*, *27*(3), 1331–1338. https://doi.org/10.1038/s41380-021-01367-9

Teicher, M.H., & Parigger, A. (2015). The 'Maltreatment and Abuse Chronology of Exposure' (MACE) Scale for the Retrospective Assessment of Abuse and Neglect During Development. *PLOS ONE*, *10*(2), e0117423. https://doi.org/10.1371/journal.pone.0117423

Teicher, M.H., Samson, J.A., Anderson, C.M., & Ohashi, K. (2016). The effects of childhood maltreatment on brain structure, function and connectivity. *Nature Reviews Neuroscience*, *17*(10), 652–666. https://doi.org/10.1038/nrn.2016.111

Thompson, E., & Zahavi, D. (2007). Philosophical issues: phenomenology. In *The Cambridge Handbook of Consciousness*. Cambridge University Press. https://doi.org/10.1017/CBO9780511816789.005

Tolchin, G., Aafjes-van Doorn, K., Horne, S., Baitch, R., & Silberschatz, G. (2023). Measures of trauma exposure and trauma response: A scoping review. *Journal of Clinical Psychology*, *79*(11), 2668–2684. https://doi.org/10.1002/jclp.23565

Tolmunen, T., Maaranen, P., Hintikka, J., Kylmä, J., Rissanen, M.-L., Honkalampi, K., Haukijärvi, T., & Laukkanen, E. (2007). Dissociation in a General Population of Finnish Adolescents. *Journal of Nervous & Mental Disease*, *195*(7), 614–617. https://doi.org/10.1097/NMD.0b013e318093f487

Tschan, R., Wiltink, J., Adler, J., Beutel, M.E., & Michal, M. (2013). Depersonalization Experiences Are Strongly Associated With Dizziness and Vertigo Symptoms Leading to Increased Health Care Consumption in the German General Population. *Journal of Nervous & Mental Disease*, *201*(7), 629–635. https://doi.org/10.1097/NMD.0b013e3182982995

van der Hart, O., & Horst, R. (1989). The dissociation theory of Pierre Janet. *Journal of Traumatic Stress*, *2*(4), 397–412. https://doi.org/10.1002/jts.2490020405

van der Kloet, D., Merckelbach, H., Giesbrecht, T., & Lynn, S.J. (2012). Fragmented Sleep, Fragmented Mind. *Perspectives on Psychological Science*, *7*(2), 159–175. https://doi.org/10.1177/1745691612437597

van Heugten – van der Kloet, D., Giesbrecht, T., & Merckelbach, H. (2015). Sleep loss increases dissociation and affects memory for emotional stimuli. *Journal of Behavior Therapy and Experimental Psychiatry*, *47*, 9–17. https://doi.org/10.1016/j.jbtep.2014.11.002

van Heugten-van der Kloet, D., Cosgrave, J., van Rheede, J., & Hicks, S. (2018). Out-of-body experience in virtual reality induces acute dissociation. *Psychology of Consciousness: Theory, Research, and Practice*, *5*(4), 346–357. https://doi.org/10.1037/cns0000172

van Heugten-Van der Kloet, D., Giesbrecht, T., van Wel, J., Bosker, W.M., Kuypers, K.P., Theunissen, E.L., Spronk, D.B., Jan Verkes, R., Merckelbach, H., & Ramaekers, J.G. (2015). MDMA, cannabis,

and cocaine produce acute dissociative symptoms. *Psychiatry Research*, *228*(3), 907–912. https://doi.org/10.1016/j.psychres.2015.04.028

Vancappel, A., & El-Hage, W. (2023). A cognitive behavioral model for dissociation: Conceptualization, empirical evidence and clinical implications. *Journal of Behavioral and Cognitive Therapy*, *33*(2), 127–137. https://doi.org/10.1016/j.jbct.2023.05.003

Vancappel, A., Suzan, L., Bailly, S., Fraigneau, M., Réveillère, C., & El-Hage, W. (2022). Exploring strategies to cope with dissociation and its determinants through functional analysis in patients suffering from PTSD: A qualitative study. *European Journal of Trauma & Dissociation*, *6*(2), 100235. https://doi.org/10.1016/j.ejtd.2021.100235

Vonderlin, R., Kleindienst, N., Alpers, G.W., Bohus, M., Lyssenko, L., & Schmahl, C. (2018). Dissociation in victims of childhood abuse or neglect: a meta-analytic review. *Psychological Medicine*, *48*(15), 2467–2476. https://doi.org/10.1017/S0033291718000740

Wainipitapong, S., Millman, L.S.M., Wieder, L., Terhune, D., & Pick, S. (2023). Assessing dissociation: a systematic review and evaluation of existing measures. *PsyArXiv Preprints*. https://doi.org/10.31234/osf.io/st5kj

Waller, N.G., & Ross, C.A. (1997). The prevalence and biometric structure of pathological dissociation in the general population: Taxometric and behavior genetic findings. *Journal of Abnormal Psychology*, *106*(4), 499–510. https://doi.org/10.1037/0021-843X.106.4.499

Watso, J.C., & Farquhar, W.B. (2019). Hydration Status and Cardiovascular Function. *Nutrients*, *11*(8), 1866. https://doi.org/10.3390/nu11081866

Weathers, F.W., Blake, D.D., Schnurr, P.P., Kaloupek, D.G., Marx, B.P., & Keane, T.M. (2013a). *The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5).* www.ptsd.va.gov

Weathers, F.W., Blake, D.D., Schnurr, P.P., Kaloupek, D.G., Marx, B.P., & Keane, T.M. (2013b). The Life Events Checklist for DSM-5 (LEC-5) - Extended. *National Center for PTSD. Www.Ptsd.va.Gov*. https://www.ptsd.va.gov/professional/assessment/te-measures/life_events_checklist.asp

Weathers, F.W., Bovin, M.J., Lee, D.J., Sloan, D.M., Schnurr, P.P., Kaloupek, D.G., Keane, T.M., & Marx, B.P. (2018). The Clinician-Administered PTSD Scale for DSM–5 (CAPS-5): Development and initial psychometric evaluation in military veterans. *Psychological Assessment*, *30*(3), 383–395. https://doi.org/10.1037/pas0000486

White, W.F., Burgess, A., Dalgleish, T., Halligan, S., Hiller, R., Oxley, A., Smith, P., & Meiser-Stedman, R. (2022). Prevalence of the dissociative subtype of post-traumatic stress disorder: a systematic review and meta-analysis. *Psychological Medicine*, *52*(9), 1629–1644. https://doi.org/10.1017/S0033291722001647

Wolf, E.J., Mitchell, K.S., Sadeh, N., Hein, C., Fuhrman, I., Pietrzak, R.H., & Miller, M.W. (2017). The Dissociative Subtype of PTSD Scale: Initial Evaluation in a National Sample of Trauma-Exposed Veterans. *Assessment*, *24*(4), 503–516. https://doi.org/10.1177/1073191115615212

World Health Organization. (2019). *International classification of diseases for mortality and morbidity statistics (11th Revision)*. https://icd.who.int/en.

Wright, D.B., & Loftus, E.F. (1999). Measuring Dissociation: Comparison of Alternative Forms of the Dissociative Experiences Scale. *The American Journal of Psychology*, *112*(4), 497. https://doi.org/10.2307/1423648