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The prevalence of Dissociative Disorders and dissociative experiences in college populations: a meta-analysis of 98 studies

This meta-analysis of 31,905 college students includes 12 studies diagnosing Dissociative Disorders (DD) and 92 studies measuring dissociation with the Dissociative Experiences Scale (DES). Prevalence rates were used to separately test the plausibility of the Trauma Model (TM) and the Fantasy Model (FM) of dissociation. Results show 11.4% of students sampled meet criteria for DD, which is consistent with the prevalence of experiencing multiple (types of) trauma during childhood (12%), but is not consistent with the very low prevalence expected from the role of fantasyproneness proposed in the FM. DES scores varied significantly across the 16 countries and were not higher in North America, but in countries that were comparatively unsafe. The least well-known DD was the most common, which is inconsistent with the FM which holds that the diagnosed person is enacting a familiar social role. There was no evidence that DES scores had decreased over recent decades, which does not support FM assertions that DD were a fad of the 1990s. Three of the five hypotheses tested provided clear support for the TM and a fourth hypothesis provided partial support for the TM. None of the five hypotheses tested supported the FM. The finding that DD were slightly more common in college populations than the general population did not support predictions of either model. The theoretical perspective of the authors moderated DES scores, although this is unlikely due to experimenter bias as studies led by FM theorists had significantly higher DES scores than those led by TM theorists.

Keywords: dissociation, trauma, abuse, fantasy

Dissociative Disorders (DD) are perhaps the most controversial psychiatric diagnoses. The aim of this paper, which examines demographic factors affecting the prevalence of DD, is to assist in resolving the debate about the etiology of DD diagnoses, with the aim of ensuring that affected individuals are able to access the appropriate treatment to alleviate frequently debilitating symptoms, including suicide, self-harm and other high-risk behaviors (American Psychiatric Association [APA], 2013). There are two major competing models of the origins of DD and corresponding dissociative symptoms: the Trauma Model (TM) and the Fantasy Model (FM)¹. TM theorists (Dalenberg et al.

¹ Mixed models are possible. So far such models have not been developed to offer predictions which would differentiate them from pure TM or FM accounts.

2012; 2014) are of the view that ongoing dissociative symptoms are a consequence, if not a continuation, of previous (particularly childhood) responses to physical, sexual and emotional abuse, emotional and physical neglect, a disorganized attachment to the primary caregiver, and other severe stress or trauma such as witnessing domestic violence. The antecedents of dissociation in the TM are sexual or physical maltreatment, sudden unexpected negative events, frightening parental behavior or parental abandonment, which are both mediated and moderated by the childhood environment, developmental level, post-trauma social support, pre-trauma and post-trauma life stress, and genetic and biological vulnerabilities (Dalenberg et al., 2012).

An alternative explanation for the origin of DD has been proposed by FM theorists. In the FM key antecedents include suggestive influences (e.g. leading questions or repeated questioning and hypnosis), exposure to media and cultural portrayals about DD, co-existing or ambiguous psychological symptoms, highly aversive events, which are then mediated by fantasy-proneness, fantasy activity, suggestibility, cognitive distortions, and disrupted sleep (all of which tend to be inter-correlated). The psychological characteristic of fantasy-proneness, however, plays a central role in the FM's alternative explanation for the symptoms. The FM posits that some (or even all) of the memories of trauma that are observed to be associated with DD are due to the affected individual's predisposition to vividly imagine and believe in socially suggested interpersonal and intrapersonal events (Lynn et al., 2012; 2014). FM theorists propose that the common process in individuals who meet the criteria for DD is that they have dissociative symptoms because *they believe they have dissociative symptoms*, and are able to imagine them in a subjectively compelling way; whereas TM theorists propose that these dissociative symptoms correspond to real divisions in the organization of relevant mental processes, created by the effects of trauma rather than by imagination or enactments.

Antecedents and moderating variables supporting both models

So far a decisive test of the TM and FM remains elusive. This is in part because the set of antecedent and moderating variables involved in the development of dissociation has been expanded by FM

theorists to include (amongst other things) trauma and highly aversive events (Lynn et al. 2014), and because TM theorists also acknowledge that trauma may sometimes be an antecedent of fantasyproneness (Dalenberg et al., 2012). Mediating factors previously identified in the FM, such as poor sleep (Van Heugten – Van der Kloet, 2013), compromised reality monitoring, cognitive failures and enhanced suggestibility are now acknowledged to (sometimes) follow from trauma in recent formulations of the FM (Lynn et al., 2014).

Trauma and highly aversive events

Childhood abuse is the primary antecedent in the TM. However, the revised FM outlined by Lynn et al. (2014) includes highly aversive events, e.g. childhood abuse, extreme loneliness and isolation, as antecedents to dissociative symptoms and experiences. Hence, evidence that abuse and other adverse experiences lead to dissociation supports the TM, but does not disprove (this version of) the FM.

Fantasy-proneness

The FM includes fantasy-proneness and fantasy activity as mediators and moderators of dissociative symptoms and experiences (Lynn et al., 2014). However, a link between fantasy-proneness and dissociative symptoms is consistent with the TM in the case that "dissociation and fantasy-proneness may correlate spuriously in part through their common connection to trauma" (Dalenberg et al., 2012, p. 13). This view is supported by Vaillant (2011) who categorizes both dissociation and fantasy as defense mechanisms. Winnicott (1971), who also considered fantasy to be a defense mechanism, goes further to explain that fantasy often operates in tandem with dissociation as a dissociated state may provide the backdrop necessary for pleasurable imaginings to take precedence over reality in order to provide respite from harsh physical and psychological experiences. The use of fantasy as a coping mechanism is recognized by Lynn and Rhue (1988) who found fantasy-prone college students were more likely than their peers to report abusive or lonely childhoods. Consistent with Winnicott, Lynn and Rhue (1988) suggest that fantasizers, who have received frequent and severe parental punishment, used their imaginative capacity to minimize physical and psychic pain and to preserve a relatively positive view of the abusive environment. One can expect the construct of fantasy-

proneness to capture some of the range of experiences initiated by a defense mechanism employing fantasy, to avoid, escape or cope with trauma, abuse and other adverse experiences.

Reality monitoring, cognitive distortions and suggestibility

The FM of dissociation includes suggestibility, cognitive distortions and failures as moderating factors of dissociative symptoms and experiences (Lynn et al., 2014). However, the possible involvement of compromised reality monitoring and thought processes, and being open to (plausible) suggestions is not denied by the TM nor are they inconsistent with it. Individuals with DD experience a disconnection from their short and long term memories, feelings, actions, thoughts, bodily sensations and/or identity (APA, 2013) and it could be expected that these dissociative symptoms, particularly if severe, may impede reality monitoring and lead to cognitive failures, and this coupled with memory problems, may make these individuals more open to suggestions. Hence, when employed in this context, these measures may simply be acting as a proxy for aspects of dissociative symptomology. ere

Sleep

The FM recognizes sleep disruptions as a moderating factor in the development of dissociation (Lynn et al., 2014). Van Heugten – Van der Kloet, Giesbrecht, and Merckelbach (2015) go further to speculate that the relationship may be causal, proposing that sleep disruptions fuel distress, degrade memory and attentional control leading to dissociative symptoms. However, Van Heugten – Van der Kloet et al. (2014, p. 15) do caution that their "sleep-dissociation model does not preclude a scenario in which traumatic experiences disrupt sleep, thereby increasing vulnerability for dissociative symptoms." This point is echoed more strongly by Van Heugten – Van der Kloet (2013) in her own PhD in which she remarks that, while sleep loss intensifies dissociative symptoms, this does not contradict the dominant idea that trauma is the underlying cause of dissociation. This line of inquiry seems plausible in light of disrupted sleep also being a post-traumatic response (Mellman & Hipolito, 2006); and improving sleep being an intervention for reducing the intensity of dissociative symptoms, particularly as disturbed sleep is a nearly universal experience for those with DD diagnosis (Boon,

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Steele, & Van der Hart, 2006). The idea that better sleep reduces dissociative symptoms, and conversely disrupted sleep increases dissociative symptoms, is consistent with findings on a range of other disorders. Disrupted sleep also predicts episodes of anxiety, depression, and mood and psychotic disorders, and fixing sleep problems helps alleviate symptoms (Foster, 2015), yet there is no suggestion that poor sleep is the underlying cause of these mental illnesses. Hence, the intensification of dissociative symptoms following sleep loss is consistent with the TM, as well as the FM. Furthermore, a review of sleep studies (Koffel & Watson, 2009) finds that dissociation is specifically related to unusual sleep experiences, including narcolepsy, REM sleep without muscle weakness, and sleepwalking. The strong link between dissociation and unusual sleep experiences suggests disrupted sleep is not the underlying causal factor, but co-occurs with trauma and dissociation.

College populations

This meta-analysis focuses solely on studies conducted in college populations for three reasons. Firstly, there is a high volume of studies conducted in this setting. Secondly, the literature informing debates as to the etiology of dissociation is largely derived from this population. Thirdly, the vast majority of studies by FM theorists are conducted in college populations, so if studies were restricted to the general population or clinical settings few studies conducted by FM theorists would meet the inclusion criteria, which may bias this analysis in favor of the TM. However, focusing on college students has a potential drawback as adolescents are known to report significantly more dissociative experiences and to display significantly more variance in their reported dissociative experiences than adults (Näring & Nijenhuis, 2005), which in turn may result in atypical findings about dissociation (Watson, 2003). College students today, however, are by no means restricted to late adolescents but include a much wider age range.

Prevalence rate predictions

The construction of the TM and FM makes it difficult to disentangle the causal role of factors that play a role in each. Both models include actual trauma as an antecedent and both recognize that fantasy-proneness can act as a defense mechanism; reality monitoring, cognitive distortions and suggestibility are all likely to be compromised by dissociative symptomology as well as to contribute to dissociative symptomology; and disrupted sleep is a post-traumatic response. It is proposed that prevalence rates of DD, in terms of the overall prevalence of DD, the prevalence of each of the DD, and the prevalence of dissociative symptoms, provides a way of circumventing these entangled dimensions to contrast a set of predictions which differentiate the TM and FM from each other.

(1) DD prevalence rates should be constrained by the prevalence of childhood trauma(TM) or of fantasy-proneness (FM)

If the FM is correct, the DD prevalence rate should be constrained by the prevalence rate of high fantasy-proneness in college students (DD individuals will be a subset of those with high fantasyproneness). Wilson and Barber (1981) identify fantasy-prone individuals as those scoring in the upper 4% of the population on their fantasy-proneness measure the Inventory of Childhood Memories and Imaginings (ICMI). The 4% threshold is supported by Lynn and Rhue (1998) who found students scoring in the top 2–4% of the ICMI also had characteristics related to fantasy-proneness, including being more hypnotizable and responsive to waking suggestion; and greater levels of absorption, vividness of mental imagery, and creativity (all of which are relevant to the FM). On this basis, we used Wilson and Barber's (1981) upper 4% as a starting point from which to consider the prevalence of high fantasy-proneness in relation to the prevalence of DD. According to the FM high fantasyproneness is necessary but not sufficient to develop DD². The individual must be high enough in the trait of fantasy-proneness, which in conjunction with other life circumstances, leads them to 1) expect and believe they experience a complex set of symptoms corresponding to, for example, a mental disorder, medical diagnosis, or some other delusion; 2) enacting the specific symptoms and/or experiences in a way that is compelling to themselves and others; this requires that 3) they have been exposed to examples of the relevant social roles required to enact DD diagnosis. Logically this very specific manifestation of fantasy-proneness must be less frequent than high fantasy-proneness alone. In addition, these individuals also need to have character traits and experiences that are specified as

² Versions of the FM which remove this requirement effectively render this model untestable against the TM.

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antecedents and moderating factors in the FM. Hence, we predict that if the FM model is correct the prevalence rate of DD observed in college populations will be substantially lower than 4%.

If the TM is correct, in a stable social setting the prevalence of DD should be less than the prevalence of the antecedents (sexual or physical maltreatment, sudden unexpected negative events, frightening parental behavior or parental abandonment) as not all individuals who have these experiences will develop dissociative symptoms or DD in adulthood due to the mediating role of factors outlined by Dalenberg et al. (2012). Not all children who dissociate in response to trauma go on to develop DD unless dissociation is employed routinely or pervasively as a response to a real or anticipated threat (Carlson, Yates, & Sroufe, 2009).

The Adverse Childhood Experiences (ACE) studies (Anda et al., 2009) in which over 17,000 Americans were surveyed to determine the prevalence of adverse experiences such as abuse, neglect and household dysfunction found 64% reported one or more ACE (one ACE: 26%, two ACEs: 16%, three ACEs: 10%, and four or more ACEs: 12%). Individuals with DD frequently report experiencing multiple types of abuse and adversity, and research indicates that childhood sexual abuse, physical abuse, emotional abuse, and neglect often co-occur in a pathogenic family environment (Dalenberg et al., 2012). Therefore, DD should be the most common in the 12% of the population that has experienced four or more ACEs. It is possible for DDD and DA to arise after a single trauma or adverse experience in childhood or adulthood (Kate & Middleton, 2018), so DD may also occur in all ACE categories from zero (i.e. solely in response to adult trauma and adversity) with the likelihood of DD increasing with each additional ACE. From a TM perspective it would be expected that an individual with a history of childhood abuse would be more likely to develop DD in adulthood when multiple forms of abuse occur frequently over an extended duration (APA, 2013). Using four or more ACEs as a proxy for multiple types of abuse, 12% of the population self-report adverse experiences consistent with many individuals with DD.

While the percentage of college students that have had adverse experiences that trigger a dissociative response is not known, a base rate can be estimated using two figures: the prevalence of

PTSD in college populations, and the proportion of individuals with PTSD meeting the criteria for its dissociative subtype. Read, Ouimette, White, Colder and Farrow (2011) found 9% of students met the DSM-IV-TR criteria for PTSD (APA, 2000), hence have experienced, witnessed, or been confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others, and that the person's response involved intense fear, helplessness, or horror, and that the experience was distressing enough to trigger a post-traumatic response. The study was conducted prior to the DSM-5 in which the dissociative subtype of PTSD was introduced, however, 12–30% of civilians and veterans with a PTSD diagnosis meet criteria for the dissociative subtype due to their marked symptoms of depersonalization and derealization, and this dissociative group has been found to have a greater exposure to childhood abuse and neglect, i.e. the type of abuse most consistent with DD, compared to those who do not meet dissociative subtype criteria (Lanius, Brand, Vermetten, Frewen, & Spiegel, 2012). From these two sets of figures it can be extrapolated that between 1-3% of students have experienced trauma that triggers symptoms of depersonalization and/or derealization severe enough to be diagnosed with the dissociative subtype of PTSD. However, the percentage of students meeting the PTSD criteria with dissociative symptoms can be expected to be higher than this figure as the dissociative subtype does not include the full spectrum of dissociative symptoms (APA, 2013). Furthermore, core PTSD symptoms such as psychogenic amnesia, flashbacks and emotional numbing are all conceptually related to dissociation (Lanius et al., 2012), which is supported by the comorbidity between DD and PTSD. For instance, 89% of patients with Dissociative Identity Disorder (DID) and a subclinical form of DID, previously known as dissociative disorder not otherwise specified type one (DDNOS-1), which falls under the category other specified dissociative disorder type one (OSDD-1) in the DSM-5, also meet diagnostic criteria for PTSD (Brand et al., 2009). Hence, the percentage of students who have experienced trauma triggering a dissociative response must be higher than 1-3%.

(2) Prevalence rates for dissociative amnesia, DDNOS-1 and DID should be consistent with the TM or FM

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Separate predictions of the TM and the FM can be assessed by comparing the prevalence of each type of DD. While TM theorists have not made explicit expectations as to the pattern of prevalence for each DD, this can be extrapolated from two premises. Firstly, in the general population there is an inverse relationship between prevalence and trauma severity, i.e. the majority of people have experienced mild trauma, whereas only a small minority have experienced the most extreme forms of trauma. Secondly, the severity of trauma exposure is positively correlated to the severity of dissociative symptoms. Bringing these two premises together it can be expected that the DD associated with the most extreme forms of trauma should be less common than those associated with less extreme forms of trauma. Hence, the DD with the highest prevalence should be Dissociative Amnesia (DA) as this can occur in response to a wide range of traumas, although it is most common among individuals who observed the murder or suicide of a family member; are sexual abuse survivors, or are combat veterans (Elliot, 1997). Therefore, DA should be accompanied by the least severe dissociative symptoms, which is congruent with the disorder being classified by Van der Hart, Nijenhius and Steele (2006) as 'primary' dissociation, which is the simplest form of structural dissociation. The next most prevalent DD should be DDNOS-1 / OSDD-1, which is associated with chronic childhood trauma and other situations where the traumatization is prolonged. DDNOS-1 / OSDD-1 should therefore have moderately severe dissociative symptoms, which is congruent with the disorder being classified as 'secondary' dissociation. The lowest prevalence should be DID as it is linked to the most severe and chronic forms of childhood trauma. DID should therefore have the most severe dissociative symptoms, which is congruent with the disorder being classified as 'tertiary' dissociation, the most complex form of dissociation (Van der Hart et al., 2006). Depersonalization / Derealization Disorder (DDD) has been excluded from this prediction as some authors have argued that it does not fit the post-traumatic model as its onset may be precipitated by drug abuse or psychological stress in adulthood, and emotional abuse is the only type of childhood maltreatment to have any significant relationship with depersonalization (Dell, 2009b).

If the FM is correct, DDNOS should be the least common DD as its characteristics are virtually unknown to those outside the dissociation field and does not correspond to any specific role

available in the wider culture. A fantasy-prone person would be more likely to enact a social role that is well defined and for which expectations are readily available, hence familiar to them. As the most common form of this disorder is DDNOS-1 (Dell, 2009a), it could be argued that this distinction is not robust enough, yet the intrusions of DDNOS-1 are far more subtle than the switching of personality states evident in DID, and the latter is characterized by amnesia whereas DDNOS-1 is not. Furthermore, the premise that DDNOS should be the lowest is supported by the fact that the authors are not aware of any media portrayals corresponding to DDNOS, and malpractice suits made against therapists accused of creating iatrogenic DD center on DID not DDNOS (Brown, Frischholz, & Scheflin, 1999). Hence, the logic of the FM predicts that DID should be more common than DDNOS.

(3) Cross-national prevalence rates should be able to be accounted for by the prevalence of trauma (TM) or of socio-cultural factors (FM)

It is proposed that the validity and plausibility of the TM and FM can be tested by examining prevalence rates across countries. Boysen and VanBergen (2013) considered the validity and plausibility of the TM and FM by examining the cross-national prevalence of DID on the premise that evidence DID only occurs in certain geographic regions would support the FM and evidence that DID is found globally would support the TM. The authors concluded DID clearly exists across cultures, which supported the TM, but as most cases were found in Western countries (where the majority of the research was conducted) the authors also comment that prevalence seems to be affected by culture, which is also consistent with the FM. Boysen and VanBergen did not examine whether cross-national differences could be explained by exposure to trauma and abuse.

If we expand the TM from the individual level (i.e. the more trauma a person has experienced, the more dissociative symptoms they are likely to display) to a collective level (i.e. the more trauma a group has been subjected to, the more dissociative, collectively, that group is likely to be) then dissociation and DD can be expected to occur across the globe as trauma is ubiquitous, and variance in prevalence rates across geographic regions and socio-cultural groups will primarily be accounted for by national, regional and socio-cultural differences in exposure to these adverse experiences. Our

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premise is supported by research from the US that finds childhood trauma and dissociative symptoms are more common in disadvantaged communities and groups, with Klest (2012) finding poverty linked to exposure to childhood trauma and dissociative symptoms, and Douglas (2009) finding significantly lower levels of dissociation in white American college students compared to their black and Latino peers, and the latter two groups are exposed to more adversities than white children (Slopen et al., 2016). Conversely, low levels of dissociation have been found in Canadian and Swiss medical students (Modestin, Lötscher, & Erni., 2002; Ross, Norton & Anderson, 1988), who can also be expected to have lower levels of exposure to childhood trauma given medical schools are dominated by students from more affluent and advantaged backgrounds (Steven, Dowell, Jackson, & Guthrie, 2016). The finding that dissociation is more common in particular socio-cultural groups than in others within the same country suggests that differences will also be found in cross-country comparisons. Therefore, we proposed that for the TM to be correct the variance in prevalence rates across countries should primarily be accounted for by national differences in exposure to sexual or physical maltreatment, sudden unexpected negative events, and frightening parental behavior or parental abandonment. Comparative data of this kind, however, is not directly available. A population that lacks personal safety and security will have a greater exposure to interpersonal trauma. Therefore, this study employs the assessment of a country's capacity to provide safety and security for its citizens as a proxy measure for the prevalence of interpersonal trauma. Legatum (2016) ranks the 149 countries it assesses from one (the safest country) to 149 (the least safe country). Such data was available for all countries in this meta-analysis with the exception of Puerto Rico.

Elaborating from the theoretical framework of the FM, we would expect that DD would be most common in countries in which the public has the greatest exposure to portrayals of specific DD or dissociative symptoms. North America is often cited as having a high level of media presentations of DID and recovered memory (Şar, Middleton, & Dorahy, 2014), and DD, particularly DA and DID, are recognized as one of a number of mechanisms that may account for the phenomenon of recovered memory (Scheflin & Brown, 1996). FM theorist Joel Paris (2019) agrees that most of the interest in DID comes from professionals in the USA and suggests this is because Americans are more susceptible to fads than their British peers. If the FM is correct, the highest rates of DD and dissociation should be found in North America, which is widely regarded as the epicenter of dissociation diagnoses and recovered memory. It could be argued that North American culture has a global reach, yet even so, its highest saturation must be in North America itself. Therefore, if the FM is correct, the lowest rates of DD should be found in countries (or regions and groups) where there is the least exposure to North American cultural exports and little or no public awareness about DD.

If the TM is correct, then levels of public awareness about DD should have little or no bearing on the prevalence of DD. This argument has been put forward in support of the TM by authors such as Dalenberg and Palesh (2004), who found widespread trauma-related dissociation in three hundred Russian university students even though there is no word in Russian directly corresponding to the Western notion of child abuse, and knowledge of clinical dissociation at that time was very rare. Turkish researchers Akyüz, Doğan, Şar, Yargiç, and Tutkun (1999, p. 151) propose that their finding that DD were relatively common was "derived from a population with no public awareness about dissociative identity disorder and no exposure to systematic psychotherapy, suggest that dissociative identity disorder cannot be considered simply an iatrogenic artifact, a culture-bound syndrome, or a phenomenon induced by media influences."

Our TM and FM predictions do not preclude variations in prevalence rates of dissociative symptomology and DD consistent with other mental disorders, noting that epidemiological studies demonstrate cross-cultural differences in prevalence rates for numerous mental disorders, including schizophrenia (McGrath, Saha, Chant, & Welham, 2008) and depression (Kessler & Bromet, 2013).

(4) Prevalence rates should be relatively stable over time (TM) or have declined substantially in the last 30 years (FM)

If the TM is correct, then changes in the prevalence rate of DD and dissociative symptoms over time should be related to changes in exposure to trauma and adversity. The prevalence of dissociative symptoms across the globe may fluctuate due to overall changes in trauma exposure. It would be expected, however, that there would be no dramatic increases or decreases in social levels of

dissociative symptoms, unless these are measured over a period marked by significant societal change, such as war and civil unrest.

If the FM is correct, then dissociative symptoms should be decreasing over time (in particular the last 30 years). FM theorist Joel Paris describes DID as a fad, and proclaims "the epidemic of DID is now behind us" (2012, p. 1078), and that the only reason it has not been consigned to history is because of a "minority who have a cultish belief in DID and repressed memories" (2019, p. 5). If DID and other DD are a fad that peaked in the early 1990s that has nearly disappeared there should be clear evidence of a dramatic reduction in the prevalence of DD and dissociative symptoms.

(5) The TM predicts the prevalence rate of DD in college populations to be moderately lower than in the general population (the FM predicts that it will be substantially lower)

The prevalence of DD in college populations identified in the present study should be constrained (have an upper bound set) by prevalence rates in the general population. TM and FM theorists agree that DD will be lower in college populations as students are more socially successful and highly functioning than those found in the general populations (Rauschenberg & Lynn, 1995, Ross et al., 1991). This is supported by Johnson, Cohen, Kasen, and Brook (2006) who found individuals in the general population with DD have impaired functioning as assessed by Endicott, Spitzer, Fleiss and Cohen's (1976) Global Assessment of Functioning Scale. From a FM perspective the impaired functioning could be viewed as the result of coexisting psychological symptoms, but from a TM perspective it could be viewed as the result of trauma and dissociative symptoms and experiences. As DD occur on a spectrum of severity, it would follow that the gap between the general and college populations widens as the level of dissociative symptomology and impaired functioning increases. Hence, when compared to the general population, one might expect the prevalence rates in college populations to be slightly lower for DA, moderately lower for DDNOS, and substantially lower for DID.

To test these predictions our first step was to ascertain the rate of DD in the general population. Several studies have examined the prevalence of DD in the general population. Ross

(1991) administered the Dissociative Disorders Interview Schedule (DDIS; Ross et al., 1989) to 454 residents of Winnipeg, Canada. The DDIS is a structured interview that diagnoses all of the DD and has been demonstrated to have good reliability and validity (Ross, 1997). Excluding eight cases of DID identified by the author as plausibly false-positives, the prevalence rate of DSM-III DD was 9.0% (DA: 7%, DDNOS: 0.2%, DID: 1.3%, DDD: 2.4%). An identical prevalence rate was found by Johnson et al. (2006) who interviewed 658 residents of New York State. The interviewees were initially asked questions about pathological dissociation from the Dissociative Experiences Scale Taxon (DES-T; Waller, Putnam & Carlson, 1996) and if the respondent answered 'yes' or 'maybe' then the interviewers followed up with relevant questions from the Structured Clinical Interview for DSM-IV Dissociative Disorders (SCID-D; Steinberg, 1994). The SCID-D is often cited as the gold standard for diagnosing DD and correctly identifying malingering (Welburn et al., 2003; Friedl, Draijer, & de Jonge, 2000; Danylchuk, & Connors, 2016). The authors found a prevalence rate of DSM-IV DD of 9.1% (DA 1.8%; DDNOS 5.5%; DID 1.5%; DDD 0.8%;). Akyüz et al. (1999) administered the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986) to 994 male and female residents of Sivas City, Turkey. Thirty-two of the 62 participants scoring over 17 on the DES were assessed with the DDIS. If the prevalence rate for the 32 subjects is projected to the 30 participants who were not interviewed, and the re-evaluation of diagnostic category made at the follow-up clinical interview are also taken into consideration, then the prevalence rate for DSM-IV DD is 3.0%, specifically DA: 1.4%; DDNOS: 0.4%; DID: 0.8%; and DDD: 0.4%. A far higher prevalence rate (18.3%) for DSM-IV DD was found in a sample of 628 women in Sivas City (Sar, Akyüz, & Doğan, 2007) in which the DDIS was administered to every participant (DA: 7.3%; DDNOS 8.3%; DID: 1.1%; DDD: 1.4%). Ferdinand, Van der Reijden, Verhulst, Nienhuis, and Giel (1995) assessed the prevalence of psychiatric disorders in 706 19-24 year olds in the Netherlands. Using the Schedules for Clinical Assessment in Neuropsychiatry (SCAN, Wing et al, 1990) to assess DSM-III DD, the authors report a prevalence rate of 2.0% for DA and 5.8% for DDNOS. Mohammadi et al. (2005) conducted a largescale epidemiological survey of psychiatric disorders in Iran (N = 25,180). DSM-IV disorders were assessed with the Schedule for Affective Disorders and Schizophrenia (SADS, Endicott & Spitzer, 1978). The authors report a very low prevalence using the

SADS (0.5% for DA and 0.06% for DDD). Bebbington and colleagues (1981; 1997) conducted two general population studies in inner London. The 1981 study found 1.2% of the sample (N = 874) met the criteria for DDD using the full Present State Examination (PSE, Wing, Cooper, & Sartorius, 1974), and the 1997 study found 1.7% of the sample (N = 759) met the criteria for DDD using the SCAN. Taking into account all of the general population studies outlined above, the average prevalence rates are as follows. DDD: M = 1.3 (SD = 1.0); DA: M = 3.6 (SD = 3.3), DDNOS: M = 3.2 (SD = 3.3), DID: M = 1.2 (SD = 0.3), total DD: M = 9.9% (SD = 6.3). While rates of DID were consistent across studies, the rates of DA and DDNOS were not, which suggests the latter two disorders may be more sensitive to different methodological approaches. These studies indicate that DD are widespread with approximately 10% of the general population meeting the criteria at some point in their life.

From a TM perspective DD are expected to be more common in college populations (Ross, Ryan, Voigt & Eide, 1991) than from a FM perspective (Rauschenberg & Lynn, 1995). Both TM and FM expect the rate of DD in college populations to be bounded by the prevalence rate in the general population; hence, a higher rate in college populations than the general population would be unexplained by either model. A moderately lower rate of DD in college populations than the general population would support the TM; while a rate that is substantially lower than the 10% found in the general population would be required to support the FM assertion that DD are rare in college populations (Layman, Gidycz & Lynn, 1996; Rauschenberg & Lynn, 1995; Zelikovsky & Lynn, 2002).

Method

A systematic review of the literature was conducted to identify studies providing prevalence rates of DD and dissociative symptoms in college students. A preliminary analysis of the studies enabling prevalence rates to be calculated on the basis of clinical interviews was conducted to ascertain whether the methodologies of these studies, particularly the screening process for selecting participants for interview, enabled actual or projected prevalence rates to be calculated. A preliminary

analysis of studies measuring dissociative experiences was also conducted to ensure the results were plausible. Using the remaining studies, the prevalence rates were calculated and tested against the predictions outlined above.

Inclusion criteria

To meet inclusion criterion for DD prevalence rates, the study must provide prevalence rates for at least one of the DD with the diagnosis based on a structured clinical interview, including the Structured Clinical Interview for DSM-IV Dissociative Disorders (SCID-D; Steinberg, 1994); the mini SCID-D that is a screening tool only (Steinberg, Rounsaville, & Cicchetti, 1987), and the Dissociative Disorders Interview Schedule (DDIS; Ross et al., 1989). To meet inclusion criterion for dissociative experiences prevalence rates, the study must use the DES, which is a 28-item self-report measure with good validity and reliability (Bernstein & Putnam, 1986; Carlson et al., 1993), and include the DES mean, or components thereof, i.e. the mean for the pathological taxon (DES-T), the subscales of absorption, depersonalization or amnesia; or the percentage of pathological dissociators in the sample, i.e. those scoring above 30 on the DES. Exceptions to this rule were made for studies from countries that were not well represented where the overall mean for the sample could be calculated simply from the mean of different groups – this is the case for studies from Germany (Wolfradt, 1997), Japan (Yoshizumi et al., 2007), and Turkey (Canan, Ataoglu, Ozcetin, & Icmeli, 2012).

Search Procedure

Three searches were conducted using the PsycINFO database in June 2017. The first search (Structured Clinical Interview for Dissociation) AND (college OR university), 2. (dissociative disorders interview schedule) AND (college or university); and 3. (dissociative experiences scale) AND ab(college or university). The third search was limited to (college or university) in the abstracts as the search (dissociative experiences scale) AND (college or university) returned over 1,700 entries nearly exclusively in clinical populations as the words 'college' or 'university' appear in nearly all academic papers in the title of the author's institution. These searches returned 451, 158, and 120

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studies respectively, of which three, six and 39 met the inclusion criteria. To complement this search, two additional searches were made on Google Scholar. Due to time constrains, only the first 100 entries returned by the search (Dissociative Experiences Scale) AND (students) were examined and 38 met the inclusion criteria, although many had been identified in the PsychINFO searches. The first 30 entries returned by the search (dissociation), (students) AND (Australia)" were examined and 10 met the inclusion criteria, although only half were Australian studies. The reason for this geographic focus is the data set was originally compiled to establish a benchmark for identifying normal and clinical levels of dissociation in college populations both in Australia and internationally to help assess the validity of a new screening tool for dissociation that was tested on an Australian university sample (Kate, 2018). The terms (Dissociative Disorders) AND (Interview) AND (College) AND (Students) was entered into the Proquest Dissertations and Thesis Search Engine and returned 40 studies. Six studies met inclusion criteria A. Published versions of three of the PhDs had been identified in the search processes outlined above. Three previous meta-analysis not specific to college populations (Dalenberg et al., 2012; Lynn et al., 2014; and Van Ijzendoorn & Schuengel, 1996) were examined, and 1, 4 and 10 studies respectively met the inclusion criteria.

Studies from countries with an official language other than English may be underrepresented in a systematic review. To address this bias and strengthen the capacity for global comparisons, fourteen studies previously identified by the first author while conducting a literature review on the international epidemiology of dissociation during her PhD research were included. These studies were from Argentina (Parra & Paul, 2009), Germany (Brunner et al., 1994), Israel (Somer, Dolgin, & Saadon, 2001), Italy (Mazzotti et al., 2016), the Netherlands (Giesbrecht, Geraerts, & Merckelbach, 2007; Giesbrecht, Jongen, Smulders, & Merckelbach, 2006, Giesbrecht, Smeets, Merckelbach, & Jelicic, 2007), Japan (Kanayama, Sato, & Ohira, 2008; Umesue, Matsuo, Iwata, & Tashiro, 1996; Yoshizumi & Murase, 2007; Yoshizumi, Murase, Murakami, & Takai, 2007), Peru (Parra & Paul, 2009), Puerto Rico (Martinez-Taboas, 1995), and Turkey (Kucukgoncu et al, 2010). Consideration was given as to whether this would bias the results in favor of either the FM or TM. Three of the studies were conducted by Giesbrecht and Merckelbach who are prominent advocates of the FM of dissociation as identified as such in the list provided by Lynn, Lilienfeld, Merckelbach, Giesbrecht, & Van der Kloet (2012) and Lynn et al., 2014. Somer and Martínez-Taboas, who are both advocates of the TM as identified as such in the list provided by Dalenberg et al. (2012), Dorahy et al. (2014); International Society for the Study of Trauma and Dissociation (ISSTD; 2013), each conducted one study. While this ratio is marginally skewed in favor of FM authors, there is no reason to expect that this misrepresents the pool of available studies/results.

Overall 12 studies met the inclusion criteria for the clinical interview meta-analysis (N = 5,390) and 92 studies met the inclusion criteria for the DES meta-analysis (N = 28,878). Six of these studies met both inclusion criteria (N = 2,363).

Analyses

Specifically, the following five predictions were tested: 1. DD prevalence rates should be bound by and/or follow variations in either, the prevalence of childhood trauma (TM) or fantasy-proneness (FM); 2. Prevalence rates for DA, DDNOS and DID should be bound by and/or follow variations in either, traumatic exposure (TM) or societal awareness of DD (FM); 3. Dissociation should be higher in countries with greater exposure to trauma per-capita (TM) or, higher in countries with the greatest awareness about DD, i.e. North America (FM); 4. There should be no dramatic decreases in dissociative symptoms over time, specifically the last 30 years, (TM) or, dissociative symptoms should have dropped dramatically as the prominence of DD representations in popular culture has waned over the same time period (FM); and 5. Prevalence rates in college populations should have an upper limit not greater than rates found in corresponding general population studies (TM and FM).

All computations were performed using Comprehensive Meta Analysis Version 3.3 (CMA; Borenstein, Hedges, Higgins, & Rothstein, 2014). According to Borenstein, Hedges, Higgins, and Rothstein (2009), a fixed effect model should be applied when all studies in a meta-analysis are measuring the same effect in the same population. In contrast, a random effects model should be used when one assumes variation in the true effect across studies. In the current meta-analysis, a random effects model was used because the sample populations differed and the effects (mean DES values

and prevalence rates) were expected to vary. CMA uses a logit transformation to stabilize variance and reduce the overweighting of studies with very small event rates that can occur with the inverse variance weighting method. Q-Values were used to measure dispersion across studies and the I-Squared index was used to determine what proportion of the observed variance was real (i.e., not due to sampling error; Cooper, 2010). Heterogeneity levels were assessed according to recommendations by Cochran (1954) and Higgins and Thompson (2002). Relationships between measured outcomes and continuous variables were examined using method of moments meta-regressions. To assess differences in outcomes across groups of categorical variables, categorical moderator analyses were conducted. Meta-regressions were conducted separately for each moderator.

Results – Dissociative Disorders

Method for calculating DD prevalence rates

Where estimates and projections have been made, these are conservative. Projected prevalence rates for a study are based on the rate of DD found in the group identified by the authors of those studies as having a high risk of DD, and extended to any other participants in the study identified as high risk but who were not interviewed. This approach is likely to under-estimate the number of DD, which do occur, albeit at far lower rates, in students who do not have pathological levels of dissociation as measured on the DES. Figures for Murphy (1994) exclude five cases where DD was deemed "likely, but inconclusive" and projections do not take into account the two students with DD found in the low dissociators group. Şar and colleagues (Sar, Akyüz Kugu, Ozturk, & Ertem-Vehid 2006; Şar, Alioğlu, Akyüz, & Karabulut, 2014) classified six individuals who met the criteria for both DA and DDD as DDNOS due to their complex presentation, but in the absence of a definitive diagnosis, these individuals are classified according to their original diagnoses of DA and DDD. Prevalence rates for each DD include double counting in these two cases, as well as individuals in Murphy (1994) and Ross et al. (1991) who met the criteria for more than one DD. Double counting can be expected to inflate the prevalence rate for less complex DD as individuals with DDNOS and DID are likely to meet criteria for DA and/or DDD (but not vice versa). Double counting did not inflate the overall DD prevalence rate as a person with more than one diagnosis was only counted once.

Preliminary analysis of prevalence rates

Prevalence rates for DD ranged from zero, found in three of the four studies co-authored with Lynn, to 28.6%, found in Gillen (1995). Under a method of moments, i.e. DerSimonian-Laird, random effects model, the mean prevalence of DD across the twelve studies is 6.7%, 95% CI [0.04, 10.2].

Table 1.

DD prevalence rates

Study name	Outcome					Event	ate and	95% C	1
		Event rate	Lower limit	Upper limit					
Anguilo 1993	DD	0.24	0.16	0.35	23	2			1
Gillen 1995	DD	0.29	0.16	0.45			H		
Gingrich 2009	DD	0.11	0.08	0.14					
Layman 1996	DD	0.00	0.00	0.01					
Murphy 1994	DD	0.09	0.07	0.12					
Nilsen 2000	DD	0.07	0.05	0.10					
Raus chenberg 1995	DD	0.00	0.00	0.01					
Ross 1989	DD	0.11	0.08	0.15					
Sandberg 1992	DD	0.01	0.00	0.02					
Sar 2006	DD	0.06	0.05	0.07					
Von Braunsberg 1993	3 D D	0.05	0.04	0.08					
Zelikovsky 2002	DD	0.00	0.00	0.07					
		0.07	0.04	0.10			•	1	
					-1.00	-0.50	0.00	0.50	1.00

A classic fail-safe N test and Duval and Tweedie's (2000) trim and fill procedure with funnel plot tested publication bias and indicated that 3,854 missing studies would be needed to invalidate the present results, i.e. for the true DD prevalence rate to fall outside the reported confidence interval. The large number of studies needed to invalidate these results reflects the width of the confidence interval with the upper bound (10.2%) being 255 times higher than the lower bound (0.04%). The funnel plot was symmetrical, and Duval and Tweedie's trim and fill indicated that no samples needed to be trimmed.

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An initial investigation confirmed a high level of heterogeneity, Q(11) = 117.193, p < .001, the I-Squared index indicated 91% of the observed variance across studies was true variance rather than error. The high heterogeneity supported the utility of exploring potential moderators (Cooper, 2010), thus an a posteriori examination of research differences was conducted to explore whether the mean DD prevalence was associated with any of the following variables: age and sex of students, region (divided into two groups: North America, and all other countries), design quality, and the Lynn team versus other authors.

A linear meta-regression using the Knapp-Hartung method (Knapp & Hartung, 2003) found the prevalence of DD was not associated with the age or sex of the students (p = .860 and p = .848respectively). Region did not moderate the prevalence rate, Q(1) = 0.277, p = .598. However, this test lacked power as only two studies were conducted outside of North America. Point estimates of prevalence of DD for each category were as follows: North America (10 studies; 9 US, 1 Canada) = 6.0%, 95% CI [3.4, 10.2]; and other countries (2 studies) = 8.1%, 95% CI [2.9, 20.9]. An analysis by country did not produce significant results (p = .736), which is not surprising given nine of the twelve studies were conducted in the US.

Studies were ranked by the authors on the strength of their methodologies with 1. being the strongest and 6. being the weakest. The two highest rankings were given to studies in which all participants were interviewed with either of the two recognized diagnostic tools – the SCID-D and the DDIS. However, as the SCID-D is often cited as the gold standard for diagnosing DD and correctly identifying malingering (Welburn et al., 2003; Friedl, Draijer, & de Jonge, 2000; Danylchuk, & Connors, 2016), studies using this instrument were given a higher ranking than those using the DDIS. A score of three was given where a full diagnostic interview was conducted following pre-screening of high dissociators with the DES (the only dissociation measure used for pre-screening in any of the studies identified), and a score of four given to the study in which all participants were interviewed with the mini-SCID-D, which in its shortened version is not a recognized diagnostic tool. The lowest ranking was given to studies that pre-screened participants for interview on the basis of an instrument

that did not measure dissociation. Design quality did moderate prevalence rates, Q(5) = 13.915, p = .016. Point estimates of prevalence of DD for each design quality were as follows:

- 1. All participants interviewed with the SCID-D (Nilsen, 2000) 7.0%, 95% CI [1.3, 30.8].
- 2. All participants interviewed with the DDIS (Gillen, 1995) 28.6%, 95% CI [5.7, 72.6].
- 3. Prescreening with the DES to identify high dissociators, then interview with the SCID-D (Gingrich, 2009; Von Braunsberg) 7.8%, 95% CI [2.4, 23.0].
- Prescreening with the DES to identify high dissociators, then interview with DDIS (Murphy, 1994; Ross et al, 1991; Sandberg & Lynn, 1992) 5.1%, 95% CI [1.8, 13.2].
- All participants interviewed with the mini-SCID-D (Anguilo, 1993) 24.0%, 95% CI [4.9, 65.9].
- Prescreening using an instrument that does not measure dissociation and interview with the SCID-D or DDIS (Şar et al, 2006; Zelikovsky & Lynn, 2002; Rauschenberg & Lynn, 1995; Layman, Gidycz & Lynn, 1996) 1.1%, 95% CI [0.3, 3.9].

Lynn was the only author involved in more than one study. Prevalence rates found by the Lynn team (0.5%) were 20 times lower than those found by other teams (10.4%) and these differences were significant, Q(1) = 32.011, p < .001. Three out of four studies by Lynn had the lowest ranking for methodology (Zelikovsky & Lynn, 2002; Rauschenberg & Lynn, 1995; Layman, Gidycz, & Lynn, 1996), so it is likely that there is considerable overlap between the Lynn Team variable and the study design variable. All studies were further assessed to identify methodological weaknesses and irregularities.

Removal of studies with methodological weakness

All four of Lynn's co-authored studies were removed for their methodological weakness in assessing DD prevalence rates.

Sandberg and Lynn (1992) was excluded as it is missing the information required to calculate projections to ensure the study is comparable. The DDIS was administered to 10% of the sample,

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specifically 33 of the unspecified number of women scoring below the mean on the DES and to 33 of the 110 females scoring above 20 on the DES. In the latter group, one met the criteria for DID and another met the criteria for DA. Hence, the prevalence rate that the authors present as evidence that DD are uncommon in college populations is based on interviews with 30% of females with high levels of dissociation and 0% of males. Colin Ross (personal communication, August 9, 2017), creator of the DDIS, estimates 13.4 DD in Sandberg and Lynn's sample (2.1%), including at least 6 cases of DID (0.9%), which is based on the assumption that there is an equal proportion of males and females. Ross states that Sandberg and Lynn's data supports the conclusion that DID occurs at a rate of about 1%, which is consistent with the epidemiological literature in both college students and the general population. However, as the female to male ratio in Sandberg and Lynn's study is unknown, Ross's projections are not included in the meta-analysis.

The four studies conducting pre-screening on a criterion other than dissociation were removed from the meta-analysis. None of the studies' methodologies were designed to examine prevalence rates, even though three studies co-authored with Lynn all make a nearly verbatim claim that their findings demonstrate that DD are rarely found in college populations.

Layman, Gidycz and Lynn (1996) administered the DDIS to 14% of the sample, specifically 60 of the 147 female students (40.8%) self-reporting rape, and 23 of the 506 students (4.5%) who did not, with a view to understanding the differences between those who acknowledged their experience as rape and those who did not. While sexual trauma is linked to DD more generally, the strongest link is with childhood sexual abuse (Ford, 2009). Even among adult rape victims, those with a history of childhood sexual abuse are significantly more dissociative (Dancu, Riggs, Hearst-Ikeda, Shoyer & Foa, 1996). Hence, childhood sexual abuse would have been a more appropriate proxy than rape status for capturing dissociation, if that had been the intention of the study. No interviewees met the criteria for DD and the correlation between the DDIS and rape status and the DES and rape status were not significant, indicating rape status is not an appropriate proxy for DD.

Rauschenberg and Lynn (1995) state their study secured important data pertinent to the base rates of DD in college populations. The authors screened over 600 American introductory psychology students to assess fantasy-proneness using the Inventory of Childhood Memories and Imaginings (ICMI; Wilson & Barber, 1981). The DDIS was administered to 7% of the sample, specifically to 16 of the 24 (67%) of highly fantasy-prone students who scored in the upper 4% of ICMI, and 8 out of the 26 (31%) medium fantasy-prone students. No interviewees met the criteria for DD diagnosis. Scores on the DDIS were significantly higher for the highly fantasy-prone students although not in the pathological range, and their DES scores (M = 16.0) were consistent with the mean DES score for US students found in this meta-analysis (M = 16.6). This indicates fantasy-proneness is not a robust proxy for DD.

Zelikovsky and Lynn (2002) administered the DDIS to 100 of the 1148 participants (8.7%), specifically to 0 of the 62 (0%) students self-reporting sexual abuse; 30 of the 58 (51.7%) students self-reporting psychological abuse; 35 of the 145 (24.1%) students self-reporting psychological and physical abuse; and 35 of the 304 (11.5%) self-reporting no history of childhood abuse. Although those interviewees self-reporting psychological and physical abuse endorsed more dissociative symptoms on the DDIS than students who self-reported psychological abuse alone or no abuse, none met the criteria for DD. Hence, psychological and physical abuse in childhood is not a robust proxy for DD. The decision to exclude those students with sexual abuse histories is noteworthy given this is the abuse type most associated with DD, and detailed information on sexual abuse history was collected by the authors. Ross (personal communication, August 9, 2017) describes this approach as highly unusual and concludes that Zelikovsky and Lynn's finding of no DD at all is likely to be due to the individuals at highest risk of DD having been removed from the analysis. Zelikovsky and Lynn's study is based on a subset of DDIS subscales: Psychiatric history, Features associated with Multiple Personality Disorder, Psychogenic Amnesia, Psychogenic Fugue, Depersonalization Disorder, Multiple Personality Disorder, and Atypical Dissociative Disorder. The authors reported the DDIS and the DES were not significantly correlated and noted their finding was consistent with results reported by Rauschenberger and Lynn (1995), although the correlation is not documented in either

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study. Zelikovsky and Lynn's lack of correlation between these two validated instruments for screening and diagnosis of DD is concerning given significant correlations (approximately r = .50) for DD specific subscales have been found in other college populations (Murphy, 1994; Ross et al., 1991) and the general population (Akyüz et al., 1999). A strong correlation would not be expected between the DES and the DDIS subscale of psychiatric history (Ross, personal communication, August 9, 2017). The non-significant relationship between DES and DDIS in Zelikovsky and Lynn is anomalous given that six out of the seven DDIS subscales used by them specifically assessed dissociation.

These three studies conducted by Lynn and his colleagues were not designed to examine prevalence rates as none used screening tools that were reliable or recognized proxies for dissociation or DD. Furthermore, not all students identified by the authors as having a higher risk of DD due to their rape status (Layman, Gidycz, & Lynn, 1996), fantasy-proneness (Rauschenberg, & Lynn, 1995) and psychological and physical abuse in childhood (Zelikovsky, & Lynn, 2002) were interviewed, noting that the DDIS was administered respectively to 41%, 67% and 20% of those identified as high risk, which equated respectively to 14%, 7% and 9% of the total sample. Furthermore, the most widely recognized antecedent of DD is sexual abuse and Zelikovsky and Lynn did not interview any of the 62 students self-reporting this experience. Ross (personal communication, August 9, 2017) observes that Lynn and colleagues finding of no cases of DD across the three studies (N = 1,291) "does not carry much weight" as these are based upon "unusual methodological exclusions" that are not readily apparent. Nonetheless, the findings do require further investigation to see if specific groups of students do not go on to develop DD despite having experienced sexual trauma or childhood psychological and physical abuse in childhood, and if so whether this group is associated with specific geographic or socio-cultural markers.

Şar and colleagues (Şar et al., 2006; Şar et al., 2014) screened 1,300 Turkish students for Borderline Personality Disorder (BPD) and administered the SCID-D to the 80 students with a BPD diagnosis as well as to a sample of 111 non-borderline students from the pool of remaining students. Hence the SCID-D was administered to 15% of the student sample. It is not known if BPD is a reliable proxy for dissociation in a college population, but studies in clinical populations demonstrate a significant overlap between borderline and dissociative symptomology to the extent that 31% to 73% of DID subjects also meet the diagnostic criteria for BPD (Brand et al., 2016). Not all individuals with DD have BPD, so the prevalence rate in Şar and colleagues studies should be lower than that found in studies directly assessing dissociation. This expectation is confirmed with the projected prevalence rate for Şar and colleagues (6.0%), lower than the 7.5%, 8.9%, 10.6% and 11.4%; 24.0% and 28.6% reported respectively in Nilsen (2000), Murphy (1994), Gingrich (2009), Ryan (1988) and Ross et al. (1991); Anguilo (1993), and Gillen (1995). Von Braunsberg (1993) was the only study to find a lower rate (5.5%). Although screening for BPD was successful in identifying cases of DD, the results are likely to considerably under-estimate the prevalence of DD and therefore have been omitted from the meta-analysis.

Dissociative Disorder prevalence (high quality design studies only)

Seven studies (N= 2,148) were included in the final analysis (Nilsen, 2000; Murphy, 1994; Ross et al., 1991; Gingrich, 2009; Von Braunsberg, 1993; Gillen, 1995; Anguilo, 1993). These studies provide a DD mean prevalence of 11.4% under the random effects model, 95% CI [7.9, 16.0%]. The dispersion across studies was significant (Q = 41.612, p < .001) with the I-Squared index indicating 86% of the observed variance across the studies is the result of true variance rather than sampling error.

DA, DDNOS and DID prevalence rates

The prevalence rate for DA was 3.6%, 95% CI [2.0, 6.3]. Dispersion of DA rates across studies was significant (Q = 27.036, p < .001) with the I-Squared index showing that 78% of the observed variance across studies to be true variance, therefore indicating high heterogeneity. The prevalence rate for DDNOS was 4.5%, 95% CI [2.3, 8.6]. Dispersion of DDNOS scores across studies was significant (Q = 50.266, p < .001) with 88% of the observed variance across studies the result of true variance rather than sampling error indicating high heterogeneity. The prevalence rate for DID was 3.7%, 95% CI [2.2, 6.4]. Dispersion of scores across studies was significant (Q = 29.517, p < .001) and I-Squared showed 80% of the observed variance across studies to be true variance indicating high heterogeneity. Although DDD was not included in the predictions, its prevalence rate was 2.2% based

 on six studies as Gingrich did not assess DDD, 95% CI [0.9, 5.3]. Dispersion of DDD rates across studies was significant (Q = 24.884; p < .001) with 80% of the observed variance across the studies the result of true variance rather than sampling error indicating high heterogeneity.

Cross national differences

Region did not moderate the prevalence rate, Q = 0.008, p = .931. The prevalence rate for the six North American studies (11.6%) was very similar to that found in the Philippines (11.0%). An analysis of prevalence rates by country (US, Canada, Philippines) did not produce significant results (p = .990), which is not surprising given five out of the seven studies were conducted in the US.

Demographic factors

A linear meta-regression using the Knapp-Hartung method found the average age of participants (N = 19,414, M = 21.0, SD = 3.7) was not significantly associated with the mean prevalence of DD (p = .979), nor was the percentage of females (p = .679), noting that over two thirds of participants (N = 25,471) were female (M = 68.2%).

Design quality

Design quality moderated the DD prevalence rate, Q = 13.766, p = .008. Point estimates of DD prevalence for each design quality ranking are as follows: 1 (1 study) = 7.0%; 2 (1 study) = 28.6%; 3 (2 studies) = 8.9%; 4 (2 studies) = 10.0%; and 5 (1 study) = 24.0%. Although study design was a significant moderator, this relationship was not linear, i.e. studies with different rankings generated different prevalence rates, but increases in the quality of the design did not lead to higher or lower prevalence rates. The interview instrument used is an important aspect of design quality so further analysis was done to determine whether this moderated prevalence rates. The point estimate for the three SCID-D studies (7.6%) was lower than for the three studies using the DDIS (13.1%), and far lower than the study using the mini SCID-D (24.0%). These differences were significant, Q = 6.650, p

= .036. However, when the mini-SCID-D was removed from the analysis, the instrument used (i.e. SCID-D or DDIS) no longer moderated the DD prevalence rate, Q = 2.560, p = .110.

Results DES

Studies with implausible and impossible DES means

Studies initially meeting inclusion criterion for the DES meta-analysis were excluded if the DES mean/s provided were implausible. It seems highly unlikely that a mean DES score in the clinical range, i.e. a score of 30 or more (Carlson & Putnam, 1993), would be found in a normal population such as college students. Four studies reported DES means higher than those found in DID patients (M = 46; Van Ijzendoorn & Schuengel, 1996). Closer investigation revealed these results were due to a scaling issue in one study and errors in calculating totals in three studies. Faith and Ray (1994) reported a mean of 70, however, the authors note that using a 0-9 scale with 28 items gave the DES a possible range of 0-252. If the scale is adjusted back to 0-100 by dividing by 2.52 the DES mean is 27.8, which is the highest plausible result found in any study. It is unclear why a 0-9 scale was used for scoring each item instead of a 0–10 scale, so without clarification about this unorthodox scoring, this study was removed from the analysis. Cicero and Kerns (2011) reported a DES mean of 56.3. The lead author was contacted and confirmed that the scales had been added rather than a weighted average being applied (Cicero, personal communication, September 14, 2017), so this study was removed from the analysis. The same error in calculation is evident in Ruiz, Pincus and Ray (1999) who found a similar mean DES (M = 55.2) by adding subscales, although their study was not included in this meta-analysis as it fell outside of the search parameters. Sapp and Hitchcock (2001; 2003) had scores over 500 as a result of adding all questions rather than averaging the 28 questions. When recalculated the means of 19.5 and 26.8 are plausible so these results are retained in the analysis, noting that the samples are of black American students who have been found to have significantly higher scores than white Americans (Douglas, 2009).

Once these studies were removed or revised, using a weighted average the remaining 81 studies (N = 26,821) yielded a DES mean score of 16.6; and of these studies 76 (25,871) reported its

standard deviation (M = 11.0), and 17 (N = 4,051) reported its median (M = 12.9). The five studies without standard deviations could not be included in the meta-analysis calculating the DES mean.

Dissociative experiences prevalence rates

Seventy-six studies (N = 25,871) indicate that, on average, college students self-report having dissociative experiences 17% of the time (M = 16.623), 95% CI [14.886, 18.359]. Statistics for each study are presented in Table 2. There is a significant dispersion of DES means (Q = 44367.260, p < 1000.001) and the I-Squared index indicates about 99.8% of the observed variance across studies is true variance. This result shows extremely high heterogeneity and supports the decision to explore potential moderators.

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Table 2.	
Mean DES scores with 959	% confidence intervals for each study

Authors	Country	М	SD	Error	Variance	Lower limit	Upper limit
Anguilo (1993)	USA	12.55	9.64	0.181	0.033	12.195	12.905
Barker-Collo (2001)	New Zealand	14.97	11.09	0.947	0.898	13.003	16.827
Bauer & Power (1995)	UK	17.65	11.90	1.202	1.445	15.294	20.006
Beere, Pica & Maurer (1996)	USA	14.33	10.29	0.882	0.779	12.601	16.059
Boysan, Goldsmith, Çavuş, Kayri & Keskin (2009)	Turkey	22.59	11.71	0.500	0.250	21.610	23.570
Brown & Katcher (1997)	USA	19.36	13.05	0.747	0.558	17.895	20.825
Brunner, Parzer, Schmitt, & Resch (2004)	Germany	1.72	1.13	0.035	0.001	1.652	1.788
Calamari & Pini (2003)	Italy	13.20	8.60	0.676	0.457	11.876	14.524
Canan, Ataoglu, Ozcetin, & Icmeli (2012)	Turkey	19.39	10.81	0.336	0.113	18.731	20.049
Collin & Jones (2004)	Australia	18.80	16.00	<mark>2</mark> .469	6.095	13.961	23.639
Dalbudak, Evren, Aldemir, & Evren (2014)	Turkey	22.50	9.89	0.601	0.361	21.323	23.677
DiTomasso & Routh (1993)	USA	19.48	13.13	0.743	0.553	18.023	20.937
Dorahy & Lewis (2001)	UK	16.95	11.23	1.184	1.401	14.630	19.270
Eisen & Carson (1998)	USA	19.00	14.60	1.281	1.640	16.490	21.510
Ensink & Van Otterloo (1989)	Netherlands	24.20	12.30	1.945	3.782	20.388	28.012
Everill, Waller & Macdonald (1995)	UK	12.80	9.67	0.967	0.935	10.905	14.695
Farina, Mazzotti, Pasquini, Nijenhuis & Di	Italy	16.70	12.00	0.390	0.152	15.986	17.464
Giannantonio (2011)	-						
Frischholz, et al. (1990)	USA	23.80	14.10	0.876	0.768	22.083	25.517
Frischholz, et al. (1992)	USA	21.80	12.80	0.726	0.527	20.377	23.223
Giesbrecht & Merckelbach (2004)	Netherlands	16.13	11.33	1.169	1.366	13.840	18.420
Giesbrecht & Merckelbach (2006)	Netherlands	18.61	10.63	0.742	0.551	17.155	20.065
Giesbrecht Merckelbach & Geraerts (2007)	Netherlands	18.95	11.26	0.369	0.136	18.226	19.674
Giesbrecht, Geraerts & Merckelbach (2006)	Netherlands	17.86	10.46	1.328	1.765	15.256	20.464
Giesbrecht, Jongen, Smulders, & Merckelbach (2006)	Netherlands	15.48	9.41	1.150	1.322	13.227	17.733
Giesbrecht, Merckelbach, Geraerts & Smeets (2004)	Netherlands	16.91	11.45	0.842	0.709	15.260	18.560
Giesbrecht, Merckelbach, Kater & Fetsje Sluis (2007)	Netherlands	16.84	11.23	0.826	0.682	15.222	18.458
Giesbrecht, Smeets, Merckelbach, & Jelicic (2007) Study 1	Netherlands	16.60	9.80	1.287	1.656	14.078	19.122
Giesbrecht, Smeets, Merckelbach, & Jelicic (2007) Study 2	Netherlands	22.30	11.00	1.344	1.806	19.666	24.934
Gingrich (2009)	Philippines	19.53	12.91	0.603	0.363	18.349	20.711
Gipple (2002), Gipple, Lee & Puig (2006)	USA	12.16	8.98	0.509	0.259	11.162	13.158

Gleaves, Eberenz, Warner & Fine (1995)	USA	16.33	11.26	0.864	0.746	14.637	18.023
Green (1997)	USA	12.98	10.47	0.316	0.100	12.361	13.599
Gutiérrez Wang, Cosden & Bernal (2011a)	Puerto Rico	13.43	12.05	0.836	0.698	11.792	15.068
Gutiérrez Wang, Cosden, Bernal (2011b)	Puerto Rico	13.38	11.96	0.797	0.636	11.817	14.943
Hyman & Billings (1998).	USA	20.95	12.84	1.853	3.435	17.318	24.582
Irwin (1998a)	Australia	12.39	9.85	0.957	0.915	10.515	14.265
Irwin (1998b)	Australia	12.01	7.47	0.736	0.542	10.567	13.453
Kanayama, Sato & Ohira (2008)	Japan	15.80	12.20	0.484	0.234	14.851	16.749
Kucukgoncu et al (2010)	Turkey	12.12	9.25	0.821	0.674	10.511	13.729
Marmelstein & Lynn (1999)	USA	16.72	10.88	1.180	1.393	14.407	19.033
Martinez-Taboas (1995)	Puerto Rico	17.40	13.80	2.035	4.410	13.412	21.388
Martínez-Taboas & Bernal (2000)	Puerto Rico	14.80	14.80	1.052	1.106	12.739	16.861
Mazzotti, et al. (2016)	Italy	17.20	12.08	0.328	0.107	16.558	17.842
Merckelbach & Jelicic (2004) Study 1	Netherlands	13.60	10.40	1.586	2.515	10.492	16.708
Merckelbach, Horselenberg, Schmidt (2002)	Netherlands	17.10	10.60	1.105	1.031	15.110	19.090
Merckelbach, Muris & Rassin (1999) Study 1	Netherlands	24.20	12.10	1.379	1.901	21.497	26.903
Merckelbach, Muris & Rassin (1999) Study 2	Netherlands	21.60	10.90	1.526	2.330	18.608	24.592
Merckelbach, Muris, Horselenberg & Stougie (2000) Study 1	Netherlands	23.60	12.10	1.867	3.486	19.941	27.259
Merckelbach, Muris, Horselenberg & Stougie (2000) Study 2	Netherlands	20.10	14.30	1.709	2.921	16.750	23.450
Merckelbach, Muris, Rassin & Horselenberg (2000)	Netherlands	20.90	10.70	1.430	2.044	18.098	23.702
Merckelbach, Rassin & Muris (2000)	Netherlands	18.20	11.50	0.933	0.870	16.372	20.028
Merritt & You (2008)	USA	14.12	12.03	0.342	0.117	13.450	14.790
Modestin, Lötscher & Erni (2002); Modestin & Erni (2004)	Switzerland	10.40	9.60	0.578	0.334	9.267	11.533
Moskowitz, Barker-Collo & Ellson (2005)	New Zealand	14.65	11.20	1.027	1.054	12.638	16.662
Murphy (1994)	USA	14.70	10.80	0.530	0.281	13.661	15.739
Naring & Nijenhuis (2005)	Netherlands	9.89	7.13	0.835	0.696	8.254	11.526
Nilsen (2000)	USA	9.06	8.30	0.373	0.139	8.328	9.792
Parra (2004), Parra & Paul (2009)	Argentina	23.66	11.71	0.460	0.212	22.758	24.562
Parra & Paul (2009) Peru	Peru	24.88	14.03	0.959	0.920	23.000	26.760
Pekala, Kumar & Marcano	USA	17.78	10.76	0.529	0.280	16.742	18.818
Pope & Kwapil (2000)	USA	14.35	11.66	0.510	0.260	13.351	15.349
Rosen & Petty (1994)	USA	14.30	10.40	0.879	0.773	12.577	16.023
Ross, Norton & Anderson (1988)	Canada	5.60	4.80	0.907	0.823	3.822	7.378
Ross, Ryan, Andreson, Ross, Hardy (1989); Ryan (1989)	Canada	11.00	1.07	0.058	0.003	10.887	11.113
Sandberg & Lynn (1992)	USA	12.10	8.80	1.083	1.173	9.977	14.223
Sanders, McRoberts, Tollefson (1989) Study 1	USA	14.60	11.00	0.626	0.392	13.374	15.826
Sanders, McRoberts, Tollefson (1989) Study 2	USA	14.90	11.70	0.637	0.406	13.651	16.149
Sapp & Hitchchock (2003)	USA	19.50	15.46	1.088	1.183	17.368	21.632
Sapp & Hitchcock (2001)	USA	26.75	18.08	1.227	1.506	24.344	29.156
Stockdale, Gridley, Ware Balogh & Holtgraves (2002)	USA	15.55	11.78	0.378	0.143	14.809	16.291
Vannucci & Mazzoni (2006)	Italy	17.82	8.95	1.070	1.144	15.723	19.917
Wolfradt (1997).	Germany	12.90	10.70	0.652	0.426	11.621	14.179
Wright & Loftus (1999)	UK	12.73	2.39	0.276	0.076	12.189	13.271
Yoshizumi & Murase (2007)	Japan	16.50	12,70	0.502	0.252	15.517	17.483
Yoshizumi, Murase, Murakami & Takai (2007)	Japan	18.05	14.10	0.665	0.443	16.746	19.354
Zingrone & Alvarado (2001)	USA	21.70	12.87	0.733	0.538	20.263	23.137
	0011	21.70	12.07	0.755	0.550	20.205	20.107

A classic fail-safe *N* test and Duval and Tweedie's (2000) trim and fill procedure with funnel plot tested publication bias *N* test indicated that 135 missing studies would be needed to invalidate the results, i.e. the true DES mean falling outside the confidence interval. The funnel plot was skewed heavily to the right. Duval and Tweedie's trim and fill indicated that 15 studies needed to be trimmed, which provided an adjusted DES mean of 15.1, 95% CI [13.5, 16.6]. These tests for publication bias are generally used for determining effect size, however, the present study is examining prevalence rates. The 15 high scoring DES studies

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were retained in the analysis (recalling those with implausible means had already been removed) as these were deemed necessary to analyze moderating factors that may lead to the higher DES scores such as those in the trimmed studies.

The mean DES-T score was provided in 17 studies (N = 4,430) and indicated that, on average, college students self-report having pathological dissociative experiences 10% of the time (M = 9.838; 95% *CI*: 8.025 – 11.652). The eight studies (N = 4,061) that provided data on the percentage of students scoring over 30 on the DES indicate 16.6% of students self-report pathological levels of dissociation and have a high risk of DD diagnosis, 95% CI [13.5, 20.2]. Means for the DES scales of absorption, depersonalization and amnesia reveal students endorse experiencing symptoms of absorption 24% of the time (17 studies; N = 7,025; M = 24.012), 95% CI [16.343, 31.681]; depersonalization 10% of the time (14 studies; N = 4,524; M = 9.772); 95% CI [6.235, 13.309] with the presence of amnesia being assessed by statements such as "some people find they have no memory for some important events in their lives (for example a wedding or graduation). Circle a number to show what percentage of the time this happens to you" (Bernstein & Putnam, 1986).

Cross-national differences

Categorical moderator analysis demonstrates country moderated DES scores, Q = 54.944, p < .001 (see Table 3).

Table 3.

Mean DES scores by country with 95% confidence intervals

Country	Studies	N	М	SD	Lower CI	Upper CI
Dom	1	214	24.0	14.0	10.2	21.6
reiu	1	214	24.9	14.0	16.2	51.0
Argentina	1	648	23.7	11.7	17.2	30.2
Philippines	1	459	19.5	12.9	13.0	26.1
Turkey	4	1,981	19.2	10.8	15.9	22.5

Netherlands	19	2.566	18.4	11.1	16.9	20.0
		2,000	10.1		10.5	20.0
Japan	3	1,725	16.8	12.9	13.0	20.5
USA	25	12,719	16.6	11.1	15.3	18.0
Italy	4	2,537	16.2	11.7	12.9	19.5
UK	4	363	14.9	9.2	11.6	18.3
New Zealand	2	256	14.8	11.1	10.1	19.6
Puerto Rico	4	677	14.6	12.9	11.2	18.0
Australia	3	412	13.9	9.9	9.8	17.9
Israel*	1	290	13.1	-		
Switzerland	1	276	10.4	9.6	3.9	16.9
Canada	2	373	8.4	1.4	3.8	13.0
Germany	2	1,325	7.2	3.1	2.6	11.8
TOTAL	76	26,821	16.6	10.8	14.9	18.4

*Israel was excluded from analysis as the SD was not reported.

DES scores were not significantly different between Western countries, M = 16.3, 95% CI [14.5, 18.1] and non-Western countries, M = 18.2, 95% CI [14.4, 21.9], Q = 0.788, p = .375; countries with English as the national language, M = 15.7, 95% CI [13.0, 18.3] and all other countries, M =17.5, 95% CI [15.0, 19.9], Q = 1.1, p = .297; or between North America, M = 16.1, 95% CI [13.0, 19.2] and the rest of the world, M = 16.9, 95% CI [14.6, 19.2], Q = 0.302, p = .583.

Further analysis was conducted to determine if the DES subscales of absorption, depersonalization, and amnesia were moderated by country. Analysis of the thirteen studies spanning six countries found that country moderated the mean amnesia scores, Q = 37.736, p < .001. From highest to lowest, the point estimates for each country was as follows: Netherlands (3 studies) = 12.5; Turkey (1 study) = 12.4; USA (6 studies) = 10.1; Italy (1 study) = 9.8; UK (1 study) = 5; and Germany (1 study) = 1.2. Analysis of 17 studies spanning seven countries found country was not a significant moderator of mean absorption scores, although there was a trend towards significance, Q =11.113, p = .085. Analysis of 14 studies spanning seven countries did not find evidence that country moderated mean depersonalization scores, Q = 9.913, p = .128.

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Meta-regressions were then conducted to determine whether dissociation was linearly associated with the personal safety and security in the country. Significant relationships were found with the mean DES scores (17 studies; regression slope = 0.266, SE = 0.011; 95% CI [0.245, 0.287], p < 0.001), the DES absorption subscale (17 studies; regression slope = 0.4626, SE = 0.022; 95% CI [0.419, 0.506], p < 0.001), DES depersonalization subscale (14 studies; regression slope = 0.187, SE = 0.008; 95% CI [0.171, 0.204], p < 0.001), and DES amnesia subscale: (13 studies; regression slope = 0.155, SE = 0.007; 95% CI [0.142, 0.168], p < 0.001). Hence, the national level of dissociation is lower in countries where the population has a greater level of security and safety.

Changes in DES scores over time

The studies included in the meta-analysis span a 30 year period, i.e. 1986 to 2016. To determine whether the mean DES score was linearly associated with the year of publication a meta-regression using the Knapp-Hartung method was conducted with 76 studies, which found no evidence of changes over time, regression slope = 0.132, *SE* = 0.139, 95% CI [0.14, 0.41], *t* = 0.95, *p* = .344.

Demographic factors

The age and sex of participants were not moderating factors. A method of moments meta regression using the Knapp-Hartung method found no evidence of changes across mean age of study participants across 62 studies, t = -0.78, p = .437. However, this result should be interpreted with caution, as there was limited dispersion in mean age across studies. Only five studies (Kwapil, Wrobel, & Pope, 2002; Pope & Kwapil, 2000; Sanders, McRoberts, & Tollefson, 1989; Wolfradt, 1997; Yoshizumi et al., 2007) reported means and standard deviations for males and females separately. Using a Random Effects model, these studies provided a mean DES for females of 14.9, 95% CI [13.6, 16.2] and a mean DES for males of 14.6, 95% CI [12.3, 16.8]. If the mean DES for women is calculated using these studies in addition to another nine studies using female-only samples (no samples were male only), the mean DES is slightly higher 15.4, 95% CI [13.3, 17.4]. Due to the small number of studies in that analysis, gender effects were also explored in a linear meta-regression using the Knapp-

Hartung method with the 71 studies that listed the percentage of females in the sample, but this was not significantly associated with mean DES (t = -0.33, p = .740).

Discussion

Cross-national prevalence rates

If the FM is correct, the highest prevalence of DD and dissociation should be in the region with the strongest representations of DD in popular culture and the greatest public awareness, which is North America. The DES meta-analysis undertaken above confirms significant variance in DES scores across countries, including the mean DES and DID symptoms as measured by the DES amnesia subscale (depersonalization and absorption scores were not significantly different across countries). DES scores were not higher in North America, in Western countries, or in countries where English is the national language. The characteristic of the country that significantly moderated DES scores (i.e. DES mean and subscales for amnesia, depersonalization, and absorption) was the proxy for national trauma exposure, i.e. the Legatum (2016) country ranking for personal safety and security. For example, the three countries with the lowest DES scores - Switzerland, Canada and Germany – were ranked as the 8th, 22nd and 7th safest countries, whereas the countries with the highest DES scores – Peru, Argentina and Turkey – were ranked 106th, 66th, 126th out of 149 countries. These findings run counter to the FM and provide strong support for the TM.

The DD prevalence rate found in North America (11.6%) was not significantly different to that found in the Philippines (11.0%). The low rate of DD (6.0%) found in Turkish students by Şar and colleagues (2006) can be attributed to a screening process designed to identify students at risk of BPD, not DD, which was the reason the study was excluded from the final calculations. It is plausible that the actual prevalence in the Turkish sample is higher than in North America considering that Brand et al. (2016) report that 27– 69% of people with DID do not have comorbid BPD, and a DD prevalence rate of 18.3% was found in a female-only general population sample in Turkey in which each woman was clinically interviewed (Sar, Akyüz, & Doğan, 2007). The current DES meta-analysis found students in Turkey had similar levels of dissociative experiences to those in the Philippines (*M*

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= 19.2 and M = 19.5 respectively) with both countries having higher rates of dissociation than the USA (M = 16.6). The finding that DES scores in Turkey and the Philippines were similar, and both countries had higher rates than North America, lends support to the TM. The prevalence of DD in Turkey and the Philippines could not be attributed to culturally specific experiences of spirit possession as Gingrich (2009) clarifies that SCID-D interviews considered this dimension and that none of the students manifested symptoms of identity alteration in this form; and Şar and colleagues (2006) note that only two of the 78 (2.6%) Turkish students with DD reported possession experiences.

The prevalence of DD

DD prevalence rates are consistent with the prevalence of multiple types of childhood trauma, not fantasy-proneness. The prevalence rate of DD found in college populations using structured clinical interviews with all participants or prescreening with the DES is 11.4% with 95% confidence that the true mean is between 7.9% and 16.0%, which supports the TM based prediction that the prevalence rate should be higher than 1–3%, and is consistent with the prevalence of experiencing four or more types of adverse experiences in childhood, i.e. 12.1%. The 11.4% prevalence rate does not support the FM based prediction that the prevalence rate should be substantially lower than that of high fantasy-proneness, i.e. far lower than 4%. It also conflicts with assertions by Layman, Gidycz and Lynn (1996), Rauschenberg and Lynn (1995), and Zelikovsky and Lynn (2002), that DD are rare in college populations (recalling that these authors' conclusions arise from methodologies that were not designed to determine DD prevalence rates).

The eight studies that provided data on the percentage of students scoring over 30 on the DES indicate 16.6% of students are experiencing pathological levels of dissociation and have a high risk of DD diagnosis. These rates exceed the 11.4% prevalence rate found using interviews. The high rate of potential DD identified by the DES might be explained by the presence of other disorders with a dissociative component, such as PTSD. A meta-analysis (Van Ijzendoorn & Schuengel, 1996) found a mean DES score of 32.6 for individuals with PTSD (studies = 9; N = 259), and a study of over 3000 matriculating college students found 9% met the criteria for PTSD (Read et al., 2011). Hence, PTSD

is common in college populations and those students with PTSD that do not have a comorbid DD may score 30 or above on the DES and therefore be identified as pathological dissociators, whereas clinical interviews would confirm they do not have DD.

DD prevalence rates in college populations are slightly higher than those found in the general population

Contrary to expectations that the impaired functioning and psychopathology associated with DD would negatively impact on academic opportunities and achievement resulting in fewer people with DD gaining college entry or continuing their studies, the 11.4% prevalence in college students was slightly higher than that found in the general population. The higher prevalence rate extended to all DD with the exception of DA which had an identical rate in both groups. The findings are inconsistent with both the TM and FM predictions that the rate of DD in college populations would be lower than in the general population. However, dissociative symptoms and experiences are common in young adults and decrease with age (Van Ijzendoorn & Schuengel, 1996), so it is plausible that the influence of higher levels of functioning in college populations was offset, at least to some extent, by the younger age of college students compared to the general population.

Impact of pre-screening with the DES

The DES was designed to capture "major dissociative psychopathology" (Bernstein & Putnam, 1986), so may not be as adept at identifying individuals with DD who have less severe symptomology. However, in this study DES cut-off scores alone were not found to be a significant moderator of prevalence rates between the three studies in which all participants were interviewed (16.6%), the one study that used a low cut-off score (11.0%), and the three studies that used a DES cut-off score of 30 or above (8.2%). Hence, the studies that interviewed all participants found DD to be twice as common as those that used a cut-off of 30 or more. This is not surprising as, even in clinical populations, DES means and standard deviations indicate that it is not uncommon for individuals with DD to score below 30 on the DES, i.e. depersonalization disorder (N = 100, M = 26.7; derealization disorder without prominent depersonalization (N = 17, M = 14.7, SD = 8.2; Simeon, 2009); DA (N = 22, M =

39.0, SD = not reported, range 26–56; Coons & Millstein, 1992), DDNOS (6 studies, N = 121, M =35.3 SD = 15.8), and DID: (18 studies, N = 472, M = 45.6, SD: 20.3; Van Ijzendoorn & Schuengel, 1996). Furthermore, the findings from studies in this meta-analysis also point to the DES having limited effectiveness in detecting DDD and DA. Firstly, Nilsen (2000), who interviewed all participants with the SCID-D, found that if she had used a DES cut-off of 30 only one of the 23 (4.3%) cases of DA and one of the four (25%) cases of depersonalization would have been identified (the DES was 100% successful in identifying the individual with DID and the three individuals with DDNOS). Secondly, the three studies where all students were interviewed produced higher prevalence rates for DDD and DA (2.0% and 3.9% respectively) than the three studies where a DES cut-off of 30 or above was used (0.9% and 1.6% respectively). And finally, correlations between the DES and interview subscales support a weaker relationship between the DES and DA and DDD as compared to DID. For example, the DDIS subscale capturing multiple features of multiple personality disorder was strongly correlated to DES scores in Ryan (1988; r = .78, p < .05) and in Murphy (1994; r = .60, p <.01), but did not share such a robust relationship with the DDIS subscales of depersonalization (Ryan, 1988; r = .44, n.s.; Murphy, 1994, r = .49, $p \le .05$) and dissociative amnesia (Ryan, 1988, r =.43, n.s.). In fact, the DES had a stronger relationship with the BPD subscale (Ryan, 1988; r = .67, p < .000.05; Murphy, 1994, r = .49, p < .05) than the latter two DD. These results support Nilsen's (2000) finding that the DES is an effective screening tool for DDNOS and DID, but not for DA or DDD.

Clinical interviews and the DES capture different aspects of dissociation. Firstly, the authors of the DES included absorption as a core component of it in recognition of absorption being an important phenomenon associated with DD (Bernstein & Putnam, 1986), yet structured clinical interviews do not share this focus on absorption. Secondly, the DES asks questions that are specific to DID and DDD, but does not contain questions that specifically assess amnesia for traumatic events, which is characteristic of DA, and only contains one question about experiences of intrusions and internal dialogue, which is characteristic of DDNOS-1 (the most common type of DDNOS), whereas these dimensions of DA and DDNOS-1 are explored in depth in clinical interviews, i.e. SCID-D and DDIS. Hence, the DES does not capture the full range of dissociative symptoms and has an additional focus on absorption. The difference between instruments is apparent in the correlations between the DES and the SCID-D (r = .52; Nilsen, 2000); the mini SCID-D (r = .43; Anguilo, 1993); and the DDIS (r = .74; Gillen, 1995). These findings demonstrate that the DES cannot be used as a substitute for structured interviews for ascertaining clinical levels of dissociation.

Choice of interview instrument

Differences in prevalence rates between instruments (SCID-D = 7.6%; DDIS = 13.1%; and mini SCID-D = 24%) were only significant when the one mini-SCID-D study was included, i.e. no significant difference was found between studies which used the SCID-D versus the DDIS even though the prevalence rate was 1.7 times higher when assessed using the DDIS compared to the SCID-D. Friedl, Draijer and de Jonge's (2000) meta-analysis of DD in clinical populations, however, found there was a three-fold chance of being diagnosed with DD if the DDIS was used instead of the SCID-D. Therefore, the possibility that the DDIS over-diagnose DD and/or the SCID-D underdiagnose DD should not be excluded. The finding that different study designs, in terms the use of prescreening processes and choice of interview instruments, *did* moderate DES scores indicates that prescreening with the DES, in conjunction with the choice of interview instrument, moderates DD prevalence rates, even though each factor is not significant individually.

Prevalence of DA, DDNOS and DID

If the FM is correct, the most common DD should be the one the public has the greatest awareness of as a person needs to be enacting expected, hence familiar, social role related behaviors and symptoms, yet the lesser known and much less socially defined DDNOS was more prevalent (M = 4.5%) than the highly recognizable DID (M = 3.7%). DA was found at a similar rate to DID (M = 3.6). The evidence only partially supported the TM hypothesis that the prevalence of different DD would reflect the rates of different forms of trauma exposure, i.e. DA should be the most common as it is associated with the broadest range of traumas; DDNOS should be less common than DA as it is associated with prolonged and repeated interpersonal trauma; and DID should be the least common of the DD as it is associated with severe and prolonged interpersonal trauma in childhood. DDNOS was more prevalent

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than DID as expected, but DA was not the most common. It is possible that DA was the most common DD in this sample, but that some individuals with DA were not identified in pre-screening processes. This is consistent with Nilsen's (2000) finding that a DES cut-off of 30 missed 96% cases of SCID-D identified DA; Ryan's (1988) finding that the correlation between the DES and the DDIS subscale for dissociative amnesia was not significant; and that the DES does not contain any questions that specifically assess amnesia for traumatic events.

Implications for future studies examining the prevalence of DD

In light of these findings, future studies should interview all participants to ensure those with DD, particularly those with DDD and DA, are not excluded from interview due to their comparatively low DES scores. This approach would avoid the use of projected rates which is required to effectively compare studies employing a pre-screening process. If interviewing all participants in the study is not feasible, all students scoring 17 or above on the DES could be interviewed, which is consistent with the DES mean found in this meta-analysis. Studies using other instruments to measure dissociation could also interview those participants scoring above the mean found in general or college population samples. To better understand the efficacy of the structured interviews, it would be valuable for all participants to be interviewed with both the SCID-D and the DDIS with interviewers blind to the results of the other interview, and in cases where DD diagnosis has only been made by one of the instruments, this should be followed up by a diagnostic interview conducted by a clinician to make a final determination on DD status and specificity of diagnosis. Similar methodologies have been used in a general population study in which the psychiatrist conducting the general psychiatric interview, which included a number of questions from the SCID-D, was blind to the results of the DDIS interview (Akyüz et al., 1999); and in a clinical population study in which the psychiatrist who conducted the diagnostic interview was blind to the results of the DDIS administered by the clinical psychologist (Dorahy, Mills, Taggart, O'Kane, & Mulholland, 2006).

Prevalence of dissociative experiences

Results from 76 studies using the DES across 13 countries reveal that, on average, students self-report experiencing dissociative symptoms 16.6% of the time with experiences of absorption self-reported at twice the rate of experiences of amnesia and depersonalization. In comparison using the DES-T, students self-report pathological dissociative experiences 9.8% of the time. This difference can be explained by the DES-T not including absorption items, which are far more common and account for 39% of all DES items. These findings provide a benchmark for interpreting normal and clinical levels of dissociation, which is of particular importance given much of the research on dissociation is conducted with college students.

The DES mean score in the present study (M = 16.6) is somewhat higher than, although not inconsistent with, those found in students and adolescents (N = 5,676, M = 14.4, SD = 11.5) in a meta-analysis by Van Ijzendoorn and Schuengel (1996).

Does the theoretical perspective of the authors make a difference?

Given the controversy about the etiology of DD and dissociation it is likely the selection process for studies will receive additional scrutiny, so post-hoc analysis was conducted to see if studies from prominent FM and TM advocates produced different findings. A rudimentary inspection of first authors shows 17 of the studies included in the meta-analysis of DES means were led by prominent FM advocates Giesbrecht and Merckelbach who were identified as such in the list provided by Lynn et al. (2012; 2014); and seven were led by prominent TM advocates Dorahy, Gleaves, Martinez-Taboas, Ross, who are identified as such in the list provided by Dalenberg et al. (2012), Dorahy et al. (2014), and ISSTD (2013). FM advocates Lynn and Loftus coauthored three additional studies (two and one respectively), and TM advocate Nijenhuis coauthored two additional studies. If experimenter bias is playing a role here it would be expected that FM theorists would find lower levels of dissociation given FM theorist assertions that DD are rare in college populations. However, post hoc analysis shows exactly the opposite effect. The 17 studies (N = 2,453) led by prominent FM theorists had a DES mean, M = 18.6, SE = .0542, 95% CI [14.4, 21.9], that was significantly higher than the six studies (N = 1,167) led by TM theorists; M = 13.5, SE = 1.558, 95% CI [10.5, 16.6], Q = 11.023, p =

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.004. The influence of the theoretical perspective of the author persisted when the analysis was extended to include studies where a prominent advocate was a listed author, i.e. when the analysis was not limited to first authors. The 20 studies that included prominent FM theorists had a DES mean, M = 17.9, SE = 0.818, 95% CI [16.3, 19.5], that was significantly higher than the eight studies that included a prominent TM theorist, M = 13.5; SE = 1.342, 95% CI [10.8, 16.1], Q = 8.047, p = .018. In FM theorist led studies the DES threshold of pathological dissociation, i.e. 30, is one standard deviation (SD = 11.2) above the mean, whereas in TM theorist led studies the threshold is more than two standard deviations (SD = 8.0) above the mean. The FM theorists' findings that clinical levels of dissociation are common contradict their own assertions that DD are rare in college populations. This suggests there is no bias due to the expectations of the experimenter but points rather towards differences in methodology.

Unsurprisingly those studies led by FM theorists also included, alongside the DES, one or more instruments measuring other constructs directly related to the FM. Further examination shows that in each case the addition of these instruments to the testing context of the DES amongst college students is associated with significantly higher DES scores than those studies in the present analysis which did not include these constructs. The 13 studies measuring fantasy-proneness (M = 19.3, SD =11.8), the nine measuring absorption (M = 20.4, SD = 13.3), the 10 measuring cognitive failures, reality monitoring or suggestibility (M = 19.8, SD = 11.8), the six measuring hypnotizability (M =19.6, SD = 12.9), and the four measuring sleep disturbance (M = 16.7, SD = 10.2) had significantly higher DES means than the 48 studies that did not measure any of these constructs (M = 15.3, SD =10.5), t(74) = 3.70, p < .001. Context effects may explain why the Netherlands had a comparatively high mean DES score despite being a ranked as the 12th safest country as 13 of the 17 studies from the Netherlands administered the DES alongside fantasy-related instruments.

Context effects are well documented in questionnaire research and do not in themselves invalidate a particular finding. The question to be asked in each case is what causal mechanism is driving the particular context effect. We propose that the present findings parallel similar results in the hypnosis literature where testing context is known to play an important role in the relationship between absorption and hypnotizability (Council, Kirsch, & Hafner, 1986). The presence or absence of other measures of imagination and fantasy have been shown to be important elements in this context effect. (Barnier & McConkey, 1999). It appears likely that higher responses to the DES are also being primed by the inclusion of these and similar variables in the same testing context by FM theorists. Interestingly, the context effects are significant even though it is probable that the DES was administered first in many studies, i.e. when responses to the DES were not primed by a previous instrument (the order in which instruments are administered is often unspecified). Future research could compare DES means when the DES is administered before and after a fantasy measure, and on its own, to quantify the impact of context effects on DES scores.

Dissociative experiences are not declining over time

The FM assertion that DD are a socio-cultural construct that reached epidemic proportions in the 1990s that has nearly died out (Paris, 2012; 2019) is not supported by the DES meta-analysis, which confirms there has been no significant decrease in dissociative experiences between the 30-year period spanning 1986 to 2016. Furthermore, the regression slope was positive (SE = 0.132), as was the lower bound of the confidence interval, indicating an insignificant increase (not decrease) in DES scores over time.

Conclusion

The premise that DD are rare in college populations is based on studies that interviewed between 9% and 14% of the sample, and the criteria for selection for interview did not relate to their dissociative symptomology (Layman, Gidycz, & Lynn, 1996; Rauschenberg, & Lynn, 1995; Zelikovsky, & Lynn, 2002). The meta-analysis conducted here using conservative projected rates indicates 11% of college students meet criteria for DD, which is consistent with the rate of DD in the general population, and the prevalence of dissociative symptoms in college populations. Future research on prevalence rates in which all participants are interviewed with the SCID-D and/or DDIS would be valuable to see if these results are replicated when pre-screening processes and projected rates are not used. This is particularly important as our findings demonstrate that the DES and structured clinical interviews

 capture different facets of dissociation, and DES responses may be sensitive to priming effects if administered with fantasy-related instruments.

Our findings indicate that the TM provides the best explanation for the pattern of variability observed in the prevalence rates of DD and dissociative experiences in college populations. The FM by contrast has no plausible explanation for these findings. It remains possible however that, even if the TM accounts for most cases of DD identified in college populations, the alternate pathway proposed by the FM could still account for a subset of these DD. Current findings then have important implications for the future of the FM as well the TM. The failure of the FM to account for the prevalence of DD and dissociation in college populations does not imply there is no role for fantasyproneness and expectancy in the generation of psychological/medical symptoms. FM researchers may therefore, be better directed to demonstrating the role of FM processes as alternative (that is as one of multiple) pathways to a variety of medical symptoms than to continue the current trend towards untestable mixed models of DD.

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* denotes studies included in DES meta-analysis

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