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Dissociation in stress-related disorders and self-harm: a review of the literature and a systematic review of mediation models

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Summary

Traumatic experiences are a risk factor for suicide and non-suicide self-injury. However, it has been hypothesized that the relation between trauma and self-harm is not a direct one, rather it is mediated by dissociation. The scope of this work is to review advances in psychopathology and pathophysiology of dissociation and its role in the context of stress-related disorders. Furthermore, a systematic review on the mediating role of dissociation between trauma and self-harm has been carried out. The systematic review confirms robust evidence of a mediating role of dissociation between trauma and non-suicidal self-injury; suicidal ideation and complete suicide as outcomes have not been addressed in the literature and need further assessment.

Keywords

Suicide • Suicidal ideation • Self-harm • Non suicidal self-injury • Dissociation • PTSD • Complex PTSD • Mediation

Introduction

Traumatic experiences (TE), especially those occurring in childhood, are a major risk factor for poor general and mental health [1], involving a vast array of psychological adverse outcomes ranging from sub-threshold post-traumatic symptoms to impaired global functioning, severe persistent psychiatric and physical morbidity [2] and increased risk of self-harm [3]. Furthermore, TE represent a serious concern for global health not only because of its direct consequences on mental health, but also because TE are an established risk factor for further violent behaviors [4], creating an epidemic-like spread of violence known as "violence cycle".

Among the long-term adverse outcomes of TE, self-harm is the most concerning one. A broad definition of self-harm includes on the one hand suicidality, that is an act (complete suicide), an attempt (suicide attempt) or the thought of (suicidal ideation) intentionally causing the death of the person, and on the other hand non-suicidal self-injury (NSSI) which is instead an intentional act pointed either at regulating emotional states or at serving interpersonal communication functions. NSSI may include self-destructive and reckless behaviors as well, such as reckless driving, risky behaviors, sexual promiscuity, gambling and substance abuse [5].

The psychopathological pathways leading from TE to self-harm are complex and depend on a number of pre-existing moderating factors, including personality trait, resiliency [6], the age of the victim, duration of victimization, and on a number of different intermediate psychological constructs that mediate the effect of the traumatic experience on the outcome.

Among such intermediate psychological factors, dissociation is currently considered one of the most important mediating variables between TE and self-harm. The present review summarizes the most recent evidence on dissociation as a mediator between TE and self-harm. Firstly, the most

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recent advances in psychopathology and pathophysiology of dissociation will be examined, secondly the role of dissociation in the context of stress-related disorders will be reviewed, finally we will systematically review evidence of dissociation mediating the effects of trauma on self-harm.

Dissociation

DSM-5 defines dissociation as "disruption of and/or discontinuity in the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behavior" [7].

Dalemberg [8] have further defined dissociation as:

"(a) a loss of continuity in subjective experience with accompanying involuntary and unwanted intrusions into aware-ness and behavior (so-called positive dissociation); and/or (b) an inability to access information or control mental functions, manifested as symptoms such as gaps in awareness, memory, or self-identification, that are normally amenable to such access/control (so-called negative dissociation); and/or (c) a sense of experiential dis-connectedness that may include perceptual distortions about the self or the environment."

The first studies on dissociation date back to the early work of Pierre Janet at the beginning of the XX century. Janet [9] proposed that dissociation regarded a lack of integration among "systems of ideas and functions that constitute personality", suggesting that dissociative symptoms were the expression of an impaired integrative capacity of the consciousness, that would eventually lead to an inability to integrate experiences and to develop a coherent representation of the self and reality as is, hindering adaptive and self-regulating behaviors. Dissociation is more commonly associated with the integrative function, dissociative symptoms are more frequently regarded of as disorders of consciousness. However since its first descriptions in Janet's work it was clear that dissociation concerned different instances of personality, thus affecting the psychic life of an individual in a rather radical way beyond discrete mental states (see below).

The strong presence of dissociation in contemporary psychopathology is mainly due to its transdiagnostic aspects: dissociative symptoms can be conceptualized along a continuum that goes from normal dissociative phenomena, for example while driving, daydreaming, or while being absorbed in an intellectual activity, to dissociative disorders, i.e. depersonalization/derealization disorder, dissociative amnesia and dissociative identity disorder. Between the two extremes of the dissociative spectrum, dissociative symptoms occur in several mental disorders: first and foremost in stress-related disorders [10 11] and personality disorders [12], but dissociative symptoms may also occur in schizophrenia, affective disorders, obsessive-compulsive disorders and somatoform disorders [13].

Classification

Dissociation is generally considered to be a multidimensional phenomenon with different phenotypes, including disengagement, emotional constriction, amnesia, depersonalization, derealization and identity dissociation [14]. However, current research on dissociative symptoms divides them into two main groups: compartmentalization and detachment symptoms [15].

Compartmentalization [16] refers to lack of integration between psychological processes with a partial inability to control or monitor mental processes that normally would be under one own's will control. It is assumed that such mental processes, while not being under one's voluntary control, still continue to operate relatively normally and influence implicitly one's psychic life. Compartmentalization symptoms include dissociative amnesia and conversion disorders.

Detachment refers to an altered state of consciousness experienced as "alienation" of oneself or the external world. During a detached state, an absence or flattening of emotions can be experienced. Detachment is the basis of derealization/depersonalization and numbing, as well as other unusual phenomena such as out-of-body experiences [16]. Subjects experience detachment as an altered state of consciousness characterized by a sense of *separation* from certain aspects of everyday experience, including their body (as in out-of-body experiences), their self (as in depersonalization), or the external world (as in derealization).

Pathophysiology

(for an extensive review see Lanius et al. [17])

The pathophysiology of dissociative symptoms is largely derived from studies on stress-related disorders and, to a lesser extent on personality disorders. Theories explaining the pathophysiology of dissociation are based on the assumption that dissociation is the expression of a complex of neural mechanisms activated by fearful stimuli. One interesting model is the undermodulation/overmodulation one [17 18]. This model derives from the evidence of the coexistence in the dissociative subtype of PTSD of detachment states and emotional dysregulation states. Overmodulation implies states of detachment and derealization, while undermodulation would disinhibit emotional responses leading to emotional dysregulation. Individuals with dissociative PTSD cycle between these two states. Centromedial amygdala (CMA) and basolateral amygdala (BLA) complexes have been involved in these mechanisms, as central modulators of fear processing receiving top-down inhibitory control from the mPFC and starting fear reaction via projections to different mid-brain structures. In the mid-brain, the

periaqueductal gray (PAG) is in turn responsible for the autonomic responses that characterize both overmodulated and undermodulated dissociative fear reactions.
Traumatic experiences are core elements of dissociative symptoms. Trauma and dissociation determine, however, structural abnormalities that may have different clinical correlates in under or overmodulated phenotypes, with predominant PTSD or dissociative symptoms [19]. It has been proposed that such alterations may be due to alterations in neurotrophic factors [20].

Structural dissociation of personality

Although dissociation is more commonly expressed as a symptomatologic dimension, it has to be considered that trauma, especially complex trauma (CT), may have a deeper destructuring effect on adult personality and profoundly interfere with personality development in children. The process by which personality development is affected by CT is known as *structural dissociation of personality* (for a review, see Van Der Hart et al. [11]). In brief, personality can be conceptualized as a balanced and integrated constellation of finalized psychobiological functions, known as *action systems*, that need to be orchestrally coordinated in order to adapt to different life situations. Action systems include, among others, sexual, competitive, cooperative systems and so forth[21]. Defensive systems are or particular importance to dissociation, as they comprise several subsystems: hypervigilance, freeze, flight, fight and submission. After exposure to CT, defensive subsystems appear to function in a non-integrated fashion respect to other action systems, causing dissociative phenomena (depersonalization) as well as inappropriate activation of agonistic/aggressive systems (rage attacks). Attachment system disruption that occur in childhood trauma contribute to this personality aspects by introducing distorted appraisal on the self as worthy of care and on the other as potentially available as a source of care or danger [22 23]. Over time, dissociated components of personality continue to separate from each other progressively losing mutual cohesion, introducing aspects of ambivalence and incoherence, to the extreme point in which some personality systems are completely unaware of what other systems do, as in Dissociative Identity Disorder.

Dissociation in stress-related disorders

After reviewing the neurobiological underpinnings of dissociation, the role of dissociation in two prototypical stress related disorders characterized by dissociative symptoms will be reviewed.
To many authors, the primary response to TE, and therefore the shared underpinning of all stress-related disorders, is dissociation[11]. The trauma/avoidance model of dissociation is the prominent psychological model of dissociation in the literature: according to this model, dissociation would be an escape response to overwhelming trauma-related emotional contents.
Although evidence of a traumatic basis of dissociation is robust, an alternative model focusing on fantasy proneness has been proposed [24 25]. According to this model, dissociation would make individuals more prone to fantasy, thereby generating confabulated traumatic memories [26]. Nevertheless, the hypothesis that the dissociation-trauma relationship is due to fantasy proneness or confabulated memories of trauma is generally weakly supported by empirical evidence [8].
For the purpose of the following review, a distinction between at least two different types of TE is required, given their different psychopathological consequences. On the one hand single TE, i.e. a car accident or a natural disaster, more often imply vivid memories of the TE, alongside with cognitive reappraisals and misperceptions. On the other hand, longstanding repeated TE, generally occurring on an intentional interpersonal basis, are more frequently associated with emotional numbing, dissociative symptoms and emotional dysregulation [27]. Enduring repetitive interpersonal TE are often referred to as “complex trauma” (CT).

D-PTSD

The relevance of dissociation to stress related disorders has been recognized by the introduction of a novel diagnostic category in DSM 5: PTSD – dissociative subtype (D-PTSD) (Tab. I). In the DSM-5 several changes regarding stress-related disorders were introduced, including a subtype of PTSD presenting prominent depersonalization or derealization symptoms [7 28]. Dissociative symptoms are not new to PTSD diagnostic criteria, as in the DSM IV edition re-experiencing symptoms and partial lack of recall were actually included as diagnostic criteria [29]. Flashbacks are accounted as dissociative symptoms in the DSM, and intrusive memories and flashbacks have been related to peri-traumatic detachment, with dissociation interfering with the encoding and consolidation of traumatic memories, resulting in poorly integrated representations of the trauma which are considered central in the development of intrusions [15]. Under a certain dissociation-centered perspective, several if not all of PTSD symptoms point back to, or are mediated by dissociation. According to the 4-D model of post-traumatic dissociation [30], dissociative symptoms may be classified according to four dimensions of consciousness: body, time, though and emotion [31]. Re-experiencing and intrusions would depend on a lack of continuity in the subjective experience of time; voice-hearing would derive from dissociative aspects of thought; depersonalization would be determined by impaired and dissociated first-person

perspective of body and, finally, emotional numbing is related to dissociative aspects of emotion regulation. From this standpoint, PTSD symptomatology as a whole is essentially mediated by dissociation. However, research have supported different connections between PTSD and dissociative symptoms, including a "comorbidity model" of PTSD and dissociation, in which both dissociation and PTSD symptoms are parallelly caused by TE, and a "component model" in which dissociation is considered a discrete component of PTSD [32]. Epidemiological evidence produced by latent class and latent profile analysis however suggest that D-PTSD is a distinct subtype of PTSD that accounts for about 15% and 30% of the cases in males and females respectively and it is more often associated with early and repetitive life trauma than adult non-cumulative TE [33], shows more severe substance use and reported [34] and more frequent comorbid depression and hostility [35].

The clinical presentation of D-PTSD is different from non-dissociative PTSD beyond the absence/presence of dissociative symptoms. Differences between the two disorders reflect the dichotomy of the emotional modulation hypothesis, according to which PTSD may present with under/over corticolimbic modulation of affective states [18]. D-PTSD is roughly characterized by overmodulation of affect, putatively due to an excess of top-down inhibitory control on limbic structures, in response to exposure to traumatic memories or trauma reminders. On the other hand, a failure of corticolimbic inhibition would be at the basis of a hyperaroused/re-experiencing PTSD, or undermodulated type, that involves the prevalence of re-experiencing and hyperarousal symptoms, and may be referred to as [18]. However, the boundary between D-PTSD and hyperaroused PTSD is not clear-cut as individual patients may display features of both presentations at the same time.

Evidence about suicidality in D-PTSD is overall scarce. To the best of our knowledge, one single study reports specifically on D-PTSD. In a cohort of 459 individuals with substance abuse disorder, patients with D-PTSD compared to PTSD reported more severe suicidal ideation and previous suicide attempts [34].

cPTSD

In the ICD-11 two main reforms of stress-related disorders have been introduced: firstly, PTSD has been modified, with more strict criteria, in an attempt to minimize comorbidity with other non-stress-related disorders. In ICD-11 a diagnosis of PTSD requires at least one symptom from each of three dimensions, i.e. re-experiencing, hyperarousal and avoidance, while symptoms that could be shared with an affective disorder such as sleep disorders, irritable mood or difficult in concentrating have been removed from the diagnostic criteria. Secondly, and most important to this review, a sibling disorder of PTSD has been introduced, "complex" PTSD (cPTSD), a disorder characterized by enduring personality changes including a wide range of alterations in regulation of affect and impulses, attention, consciousness, self-perception, perception of the perpetrator, interpersonal relationships and systems of meaning. cPTSD is an evolution of the preceding disorder in ICD "Enduring personality change after catastrophic experience" (EPCACE), and largely derived from Disorder of Extreme Stress Not Otherwise Specified (DESNOS) in the Appendix of DSM-IV-TR [36 37]. cPTSD diagnosis serves to acknowledge the major self-organization and personality disturbances that occur as a response to enduring interpersonal trauma, otherwise referred to as "complex trauma" (CT). CT exposure involves enduring and repetitive interpersonal traumas, more frequently occurring during childhood and adolescence with repeated childhood sexual or physical abuse, but it may also affect adults as in the case of torture, slavery, genocide campaigns, prolonged domestic violence. CT disrupts early attachment relationships and brain development, with severe outcomes involving significant difficulties with emotional, behavioral, somatic, and cognitive dysregulation [38].

How central dissociation is in cPTSD is unclear as a consensus on what constitutes the construct is still lacking [11]. cPTSD criteria include standard post-traumatic re-experiencing, avoidance and hyperarousal symptoms in addition to disturbance in self-organization (DSO) symptoms, a cluster that includes Affective Dysregulation, Negative Self-Concept and Interpersonal Problems.

While the latter two clusters derive from disruption in the attachment system [23 39], affective dysregulation has been proposed to be more closely related to dissociative phenomena. In fact, affective dysregulation has been conceptualized according to a model that closely resembles the emotional modulation hypothesis of dissociation, with a hyperactivation sub-cluster that comprises heightened emotional reactivity and emotional vulnerability together with reckless behavior, and a deactivation sub-cluster that comprises depersonalization, derealization and numbing [40].

Restructuring of diagnostic criteria from DSM IV to DSM 5 and from ICD-10 to ICD-11 may yield to some confusion regarding differential diagnosis between DSM 5 PTSD and ICD-11 cPTSD, because some of the new criteria in DSM 5 share some dissociative aspects of the DSO [41 42]. In Table I we compare diagnostic criteria across 4 different systems for PTSD and cPTSD. cPTSD items were derived from Cloitre et al. [43] (Tab. I).

Dissociative symptoms are crucial to cPTSD and for the differential diagnosis between cPTSD, although this evidence is more often referred to DESNOS. For exam-

TABLE I. *Comparison of the diagnostic criteria for PTSD and sibling disorders across different diagnostic manuals.*

DSM-IV-TR PTSD Re-experiencing 1/5	DSM 5 PTSD Intrusion 1/5	ICD 10 PTSD Remembering - reliving	ICD 11 PTSD Remembering – reliving (1/3)	cPTSD Remembering - reliving
Recurrent and intrusive distressing recollections of the event, including images, Thoughts, or perceptions	✓	✓	✓	✓
Recurrent distressing dreams of the event	✓	✓	✓	✓
Acting or feeling as if the traumatic event were recurring (reliving the experience, illusions, hallucinations, and dissociative flashback episodes)	✓ Modified – dissociative flashbacks	✓	✓	✓
Psychological distress at exposure to internal or external reminders of trauma	✓	✓		
Physiological reactivity at exposure to internal or external reminders of trauma	✓	✓		
Avoidance and numbing 3/7	Avoidance 1/5		Avoidance (1/3)	Avoidance
Efforts to avoid internal reminders	✓		✓	✓
Effort to avoid external reminders	✓		✓	✓
	Negative alterations in cognitions and mood 2/5			Disturbance is self-organization
Dissociative amnesia	✓	✓		
Markedly diminished interest or participation in significant activities	✓			
Feeling of detachment or estrangement from others	✓			✓ (DSO Interpersonal)
Restricted range of affect	*Modified* – persistent inability to experience positive emotions			✓ (DSO)
Foreshortened future	*Modified* – negative beliefs or expectations about oneself, others, or the world			✓ (DSO negative self-concept)
	New – persistent distorted blame of self or others for causing the traumatic event or for resulting consequences			✓ (DSO negative self-concept)
	New – persistent negative emotional state			
Hyperarousal 2/5	Hyperarousal 2/5	Hyperarousal	Hyperarousal 1/3)	Hyperarousal
Difficulty falling or staying asleep	✓	✓		
Irritability or outbursts of anger	✓	✓		✓ DSO affect dysregulation
Difficulty concentrating	✓	✓		
Hypervigilance	✓	✓	✓	✓
Exaggerated startle response	✓	✓	✓	✓
	Self-destructive or reckless behavior			
	Specifier: w/dissociative symptoms			

ple, two works [44 45] have addressed dissociation in individuals with cPTSD. Both studies have found a higher prevalence of depersonalization and derealization, however cPTSD cases were selected using diagnostic instruments designed for DESNOS, that has different diagnostic criteria compared to cPTSD and includes dissociation in its diagnostic criteria, hence making such conclusion spurious. However, in two studies comparing DSM 5 and ICD 11 of PTSD and cPTSD assessed with dedicated instruments, dissociative symptoms levels effectively separated ICD 11 PTSD from cPTSD [42 46]. In another study, Elklit and colleagues [47] found higher levels of dissociation in cPTSD compared to PTSD patients, although the finding of other unspecific symptoms dimensions being heightened in cPTSD could be explained by a general clinical severity.

Contrasting positions are present in research whether dissociation should be considered as a part of cPTSD or a closely related, but separated, cluster of symptoms. Some authors have questioned dissociation as being a part of emotional dysregulation, having successfully tested the hypothesis that dissociation is indeed a mediator between CT and cPTSD [48]. However, the authors have addressed cPTSD using a structured interview for DESNOS that originally included symptoms of dissociation, removing those items and testing dissociative symptoms from the outside on cPTSD, making their conclusions questionable. A recent network analysis on a sample of 219 traumatized individuals assessed the network structure of symptoms of PTSD, cPTSD and Borderline Personality Disorder (BPD) [40]: in this work dissociative symptoms were central to both cPTSD and PTSD, with dysregulation symptoms, namely anger, reckless behavior, feelings of being distant from others, and identity disturbances, clustering together with BPD symptoms. The evidence of BPD and cPTSD symptoms clustering away from each other supports that BPD and cPTSD are indeed two separate disorders, a thing that has been questioned in the literature [49]: BPD is typically associated with instability in the sense of self that cycles between positive or negative self-evaluation and by emotionally intense and unstable relationships with idealizing and denigrating cycles and paranoid ideation. CPTSD in contrast is a stable condition. Moreover, a history of CT is not a diagnostic criterion for BPD.

Dissociation and self-harm

Dissociation and dissociative disorders have been associated with increase rates of self-harm. Meta-analytical summary of findings on the relation between self-harm and suicidality may be found in Calati et al. [50]. In this meta-analysis rates of suicide attempts and NSSI were compared in psychiatric patients with and without dissociative disorders, finding a 6-fold increase in suicide risk and 7-fold increase in NSSI risk for patient with dissociation disorders. Dimensional rather than categorical dissociation, assessed using the Dissociative experience Scale, was associated with a significant increase in suicide attempts and NSSI. In the following section, we will review the main theoretical implications linking dissociation with NSSI and suicide.

NSSI

(for an extensive review see Cipriano et al. [51])

NSSI has often an interpersonal function and is more frequent in adolescents. NSSI is the deliberate damage of one's own body in the absence of lethal intent, including, among others, cutting, head-banging, burning, slashing behaviors. NSSI is such a concerning issue that has been introduced in the DSM 5 as a separate disorder [52]. NSSI is highly prevalent among general and clinical populations: Briere and Gil [53] reported a 21% of prevalence in a clinical sample, with a particular focus of PTSD and dissociative symptoms, while others have estimated a prevalence of 6.7% in the general adolescents' population [54] and up to 50% in an adolescents' inpatient sample. NSSI is prevalent across several disorders beyond BPD, of which it is a diagnostic criteria, including PTSD and dissociative disorders above all [51]. In particular, in an Italian study a strong association of NSSI and dissociation was found, with individuals with a history of NSSI having higher levels of dissociation [55]. Early TE such as parental neglect, abuse, or deprivation are among the major risk factors for NSSI. In particular, child emotional abuse, compared to other types of adverse childhood experiences has the largest effect [56]. Research suggests that NSSI has two major "functions": an *intrapersonal* and an *interpersonal* or *compensatory* one. Both intrapersonal and interpersonal functions can positively and negatively reinforce NSSI. For example, NSSI could help regulating negative mental states including dissociation or anger, experiencing positive feelings or thoughts during or after engaging in NSSI (i.e., feeling alive), reinforcing social interaction (i.e., getting attention or communicating), or escaping unpleasant social interactions (i.e., ending an argument, not attending sports class) [57 58]. Compensatory NSSI seems to be the most frequent type, enacted as a strategy for compensating stressful emotional states and dissociation, and is the most relevant in individuals experiencing dissociation after TE [54 59].

Suicidality

While an extensive literature addresses the association of dissociation and NSSI, the relation between suicide and dissociation has received less attention, and to date no autonomous model of suicidality in dissociative disorders has been proposed. In fact, the issue of suicidality is often addressed in continuity with NSSI. A

review [60] has addressed extensively the association between NSSI and suicidal behavior. Three main models address the relation between NSSI and suicidality: in a first model, the Gateway model, NSSI and suicide are conceptualized along a continuum of severity, with NSSI being an extreme of the spectrum and complete suicide the other and NSSI preceding the onset of suicide. This model is supported by a number of both cross-sectional and longitudinal evidence of NSSI predicting suicide. Under a "third variable" theory, an unspecific factor would be responsible for both NSSI and suicide, with their mutual association being spurious. According to the "Theory of Acquired Capability for Suicide"[61], NSSI is one way among many others individuals may increase their acquired capability for suicide with, as NSSI may habituate an individual to the fear and pain associated with suicidal self-harming behaviors.

Systematic review of mediation models

The most commonly proposed model that unifies TE, dissociation and self-harm is a mediational model: in statistical terms, a mediation occurs when an independent variable, TE in this case, does not exert a direct effect on an outcome variable, i.e self-harm, but act *indirectly* via a third variable, dissociation. Mediation implies a number of assumptions and consideration when assessing relationships among more than two variables: firstly, in order to ascertain mediation, the independent variable has to be related to the outcome variable when not controlling for the mediator; secondly the independent variable has to be related with the mediator variable; thirdly the mediator has to be related to the outcome. Mediation occurs when the effect of the independent variable on the outcome is significantly reduced or abolished when controlling for the mediator. Translating statistics to psychopathology, mediation occurs when it is demonstrated that TE cause both dissociation and self-harm, when dissociation causes self-harm and when TE no longer have an effect on self-harm when taking into account dissociation.

For the following section, a systematic search was performed on Pubmed and Scopus with the following keywords: mediation AND (dissociation OR dissociative) AND (suicide OR self harm OR nssi OR self-harm OR self-injury OR "suicide attempt" OR self-injurious behavior OR mutilation). The search returned the same 17 articles on both databases. Articles were inserted in the following section only if meeting the criteria of addressing the mediating role of mediation between TE and self-harm.

Evidence for dissociation as a mediator between TE and NSSI is robust: Briere and Eadie [58] have addressed mediation in a large sample from the general population using a robust path analytical model. In their sample dissociation fully mediated the effect of adverse events, posttraumatic stress and depression on NSSI. They propose that rather than resulting directly from stress-related or depressive symptoms, NSSI occurs in response to dissociation, as a compensatory strategy to interrupt unwanted hypoarousal and numbing.

In their work Zetterqvist et al. [59] have addressed differentially if dissociation and depression would mediate the effect of TE on NSSI with a compensatory or interpersonal function, finding that NSSI serves as a relief for painful or dissociative mental states rather than as a dysfunctional communication channel in the case of traumatized individuals.

Another work by Chaplo et al. [62] confirmed a similar model in a sample of over 500 youths recruited from the US juvenile justice system, hence inherently displaying externalizing behaviors. In their sample childhood sexual abuse (CSA) was the TE with the largest effect on post-traumatic symptoms and NSSI. Mediation analysis confirmed dissociation and emotional dysregulation as intermediate variables between sexual abuse and NSSI. Howard and colleagues [63] failed to replicate the mediation, probably due to small sample size, in an otherwise interesting study in which different mediators were tested, including separated PTSD dimensions, emotional dysregulation and dissociation. In this work only hyperarousal and emotional dysregulation partially mediated the TE-NSSI relationship. The authors hypothesize that dissociation failed to mediate the TE-NSSI relationship in their sample because TE were assessed in an excessively broad way, while previous report that the effect of CSA in particular is mediated in the TE-NSSI relationship. This interpretation is interesting, as it warrants further systematic studies to assess the differential role of different types of TE on NSSI and on dissociation. In a sample of over 400 female college students [64] different self-destructive outcomes have been investigated. This study has extended the CSA-dissociation relationship on self-destructive behaviors other than NSSI, finding an effect on drug and alcohol use. A mediating role for dissociation was replicated in this study.

In an interesting work the established mediation model TE-dissociation-NSSI introducing narcissism as a moderator [65]. In statistical terms, a moderation occurs when the relation between two or more variables, TE-dissociation-NSSI in our example, occurs differently at different levels of a moderator variable, narcissism in this case. Both vulnerable narcissism and grandiose narcissism were found to moderate the relation between dissociation and self-harm. In this study the relation between dissociation and NSSI was stronger in individuals with high levels of vulnerable narcissism, while it was weaker in individuals with high levels of grandiose narcissism, suggesting that vulnerable narcissism could be a factor

of risk-enhancement for NSSI in traumatized and dissociating individuals. This is somewhat coherent with the concept that vulnerable narcissists tend to engage into grandiose fantasies in a dissociative like-state.

PTSD and dissociation were explored as mediators of polyvictimization on a number of outcomes, including suicide ideation, in another sample of youths involved in the juvenile justice system [66]. In this study dissociation was found to mediate the effects of TE on internalizing symptoms and suicidal ideation, while PTSD symptoms mediated the effect on externalizing symptoms. In this study dissociative symptoms were derived from a PTSD assessment instrument, which could confuse the results, highlighting the importance of assessing PTSD symptoms separately from dissociative symptoms, although belonging to parent constructs. However, this study is of great importance as it provides the first evidence of a mediation of TE-Dissociation of suicidal ideation rather than on NSSI, and secondly because it addresses externalizing and internalizing behaviors together, providing different pathways from TE to the one or the other. An externalizing/internalizing mixed clinical presentation may occur more often than what expected, and externalizing behaviors should be taken into account for future studies, given the importance they have in perpetuating the interpersonal violence cycle. Externalizing behaviors have been taken into account under a different conceptual model [67]: in this study both dissociation and hostility were entered in the model as mediators between sexual assault and suicidal ideation, finding that both mediators had a partial mediating effect. This finding is in line with the above reported TE-PTSD-suicidality, suggesting that both under and over modulated response to TE could lead to risk of suicide, through different pathways.

Conclusions

In the present paper we systematically reviewed the evidence of dissociation being the principal mediator of the effects of TE on self-harm. We found a robust evidence of the mediating role of dissociation on NSSI, confirmed by different studies in different populations. Evidence for suicidal ideation was nevertheless weak, and we couldn't find any evidence on suicide attempts. Such a lack of evidence on suicidal ideation and suicide attempts should be addressed in the future. NSSI is a major risk factor for suicide attempts and complete suicide, however a number of mechanisms may differentiate the pathways that terminate at NSSI from those that progress to complete suicide.

Conflict of interest

The Authors have no conflict of interest to declare.

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