



Disordered eating as a repercussion of sexual assault: a consequence to consider

Aurore Malet-Karas¹ · Delphine Bernard² · Emmanuelle Piet³ · Eric Bertin^{4,5}

Received: 14 September 2021 / Accepted: 28 December 2021
© The Author(s), under exclusive licence to Springer Nature Switzerland AG 2022

Abstract

Purpose This study aims at clarifying the links between sexual violence and disordered eating (DE).

Methods In a sample of 12,638 victims of self-reported sexual violence, we analyzed the situation of 546 victims that declared having developed DE. We assessed the characteristics of the assault (age, type of aggression) and the medical consequences (PTSD, depression, suicide attempts, anxiety disorders, etc.).

Results DE prevalence was 4.3% in the victim sample. The age of the first assault in DE victims was significantly lower than that of the whole population (12 years vs 16 years for median; $p < 0.001$). A much higher prevalence of sexual assault consequences was present in victims developing DE with odd ratios (OR) for: self-mutilation (OR = 11.5 [8.29–15.95], $p < 0.001$); depression (OR = 5.7 [4.81–6.86], $p < 0.001$); self-medication (OR = 5.3 [3.86–7.19], $p < 0.001$); suicide attempts (OR = 4.5 [3.59–5.67], $p < 0.001$); post-traumatic stress disorder (OR = 3.8 [2.99–4.78], $p < 0.001$); anxiety troubles (OR = 5.2 [4.11–6.47], $p < 0.001$); alcoholism (OR = 4.0 [2.81–5.58], $p < 0.001$).

Conclusion This study confirms the link between DE and sexual violence, especially in childhood, leading to severe psychological consequences. In this context, DE should be envisaged as a coping strategy accompanying emotional dysregulation due to traumatic events, and be treated as such.

Level of evidence Level IV: Evidence obtained from multiple time series analysis such as case studies.

Keywords Sexual abuse · Rape · Eating disorder · Sexual violence · Post-traumatic stress disorder · Childhood

Introduction

Eating disorders (EDs), that are characterized by severe disturbances in eating behavior and body weight, are well-known inducers of social exclusion, poor quality of life, and various somatic complications [1, 2]. EDs are also

associated with one of the highest rates of mortality of any psychiatric disorder [3].

According to the DSM-5 classification [4], the main EDs are anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). AN is characterized by an active food restriction associated with body distortion (corpulence perceived larger than it is) and a fear of letting go on weight and/or food control behavior. BED corresponds to recurrent access (≥ 1 /week for a minimum of 3 months) of binge eating, and thus promotes the occurrence of obesity. BN is similar to BED, but accesses of binge eating are followed by purging behaviors (vomiting, use of laxatives, etc.) and are associated with strong preoccupation with body image, thus maintaining a normal body weight. AN and BN are much more frequently reported in women than in men, while BED is nearly equally represented in both genders [5].

As EDs are under-researched in clinical practice, there is a great deal of uncertainty as to their real prevalence and pathophysiology [6]. No specific therapeutic approach of EDs has shown clear superiority, with the exception of a

✉ Eric Bertin
ebertin@chu-reims.fr

¹ Sexologist in Puteaux, Puteaux, France

² Association “Le Regard du Miroir”, 5 Boulevard Foch BP 62732, 51100 Reims, France

³ Association “Collectif féministe contre le viol (CFCV)”, Paris, France

⁴ Clinical Nutrition Transversal Unit (UTNC) of Reims University Hospital and Performance, Health, Metrology, Society Laboratory (PSMS, EA 7507) of Reims Champagne-Ardenne University, Reims, France

⁵ Hôpital Robert Debré, Unité 63 Nutrition, 45 rue Cognacq Jay, 51092 Reims, France

combination of nutrition therapy and psychotherapy (more particularly familial psychotherapy in AN) [7].

A combination of various factors is hypothesized in EDs pathophysiology: individual (biological and psychological), familial, cultural (contributing to thin-ideal internalization and restrained eating), and genetic ones [8–12].

Environmental factors promoting negative emotions such as a poor self-esteem, a high level of anxiety, and/or mood disorders appear to be particularly significant in EDs [13–16]. Recent studies reported that adverse life events can lead to the suppression of negative emotions through emotional overeating or restrained eating [17, 18]. Family-related non-abuse adverse life experiences (adverse parenting style; loss of a family member; familial mental health issues; family comments about eating, or shape, weight and appearance) were shown to be significantly associated with EDs [19].

Traumatic events, such as physical neglect in childhood [20], bullying in adolescents [20], and violence in adults [21], were also reported in people suffering from EDs. A meta-analysis has shown that childhood maltreatment (i.e., emotional, physical, and sexual abuse) prevalence is high in all types of ED (prevalence rates 21–59%) and with severity parameters that characterize these illnesses in a dose dependent manner [22]. ED patients with childhood maltreatment are thus more likely to be diagnosed with a comorbid psychiatric disorder (OR: 1.41–2.46) and to be more suicidal (OR: 2.07) than ED subjects not exposed to childhood maltreatment.

Sexual violence is defined as: “any sexual act, attempt to obtain a sexual act, unwanted sexual comments or advances, or acts to traffic, or otherwise directed, against a person’s sexuality using coercion, by any person regardless of their relationship to the victim, in any setting, including but not limited to home and work” [23]. Even though the WHO reports that about 30% of women are victim of sexual violence, it remains however difficult to scale the exact estimate of sexual violence [24] (for a review, see Kilimnik and Melson [25]).

Sexual assault has been identified as a potent risk factor for sexual dysfunction [26], and increased likelihood to develop chronic physical and mental disorders, including substance abuse, suicide [27], post-traumatic stress disorder (PTSD), and depression [28] (for a review, see [29]). Nonetheless, the scope of the impact of sexual violences remains underdocumented, and their consequences on the victims’ health are still unclear.

A recent body of studies points at a significant correlation (and even a causal relationship) between sexual assault and EDs. In a national comorbidity survey-replication study, a history of rape or sexual assault was found to be more frequent in subjects with EDs (respectively, 80.9% in women and 68.2% in men with AN, 80.2% in women and 41.6%

in men with BN, and 54.3% in women and 29.1% in men with BED) than in subjects without ED (history of rape or sexual assault found, respectively, in 32.7% of women and in 6.9% of men) [30]. Recent sexual assaults in adults were also reported to contribute to various current EDs symptoms independently from childhood abuse. Additionally, women who were survivors of rape or sexual assault were more likely to report a lifetime ED than women with no history of sexual trauma [31]. One of the first studies on the impact of sexual assault mentioned that the victims reported stomach pain mainly due to the fear they faced [32].

However, it remains unclear whether the age of the assault is relevant for the development of EDs.

Some research found that the intensity of EDs could be influenced by the repetition of sexual violences at different ages [33, 34], while other research support that the role of sexual violence on ED appearance does not seem to depend on the age of assault. For example, food addiction was shown to be independently associated with exposure to early life psychological and sexual abuse [35]. Other found a more subtle discrepancy while screening for the different EDs subtypes, with a significant association between trauma—especially sexual abuse—in childhood and the development of obesity and BED in adulthood [36].

Among female college students, those reporting sexual violence in the past year were more likely to engage in purging in the past month than participants who had not experienced sexual violence [37].

In the literature, an association between EDs and PTSD is often discussed. In hospitalized patients with EDs, at least one traumatic event was found in 74% of them, and 52% of patients met diagnostic criteria for PTSD [38]. In outpatients consulting for an ED, the prevalence rate of PTSD varied between 10 and 34% [39, 40], and those who experienced sexual trauma had significantly higher levels of PTSD symptoms than the others [41].

This association between EDs and trauma or PTSD has compelling consequences in therapy, since the patients with both PTSD and ED have a more severe and complex course, and are significantly more likely to drop out of treatment and relapse [42–44]. The impact of traumatic experiences would negatively predict remission of ED after cognitive behavioral therapy [45, 46]. Furthermore, PTSD increases the probability to develop other symptoms such as mood alterations, anxiety, dissociation, substance use, impulse control, disruptive behavior, personality ranges, and various psychosomatic symptoms [47], which can hinder the accurate diagnosis.

In these cases, the main difficulty for the clinician is to identify a history of sexual assault, often shameful for the victim and therefore sometimes not identified as such or can be suppressed or erased from the memory by a dissociation mechanism [48–51]; it can also remain inaccessible

consciously, because it took place too early in childhood to be retrieved as an autobiographical episode [52].

A better characterization of sexual abuse-related disordered eating (DE) is thus needed to help clinicians better identify traumatism in their patients. Moreover, the potential relationships between the age of the victims, the characteristics of the sexual abuse, and the type of DE induced have yet to be explored, as, to our knowledge, no study has specifically investigated on a large scale the prevalence and characterization of DE within a population of sexual victims.

The aim of this study is to further the understanding of the links between DE and sexual violence, by studying a large population of victims of sexual violence and analyzing what kinds of characteristics differ when comparing subjects who developed DE and those who did not. We focused on psychological consequences related to PTSD, and hypothesized that the victims that developed DE presented more severe signs of trauma and more severe DE.

Methods

Dataset

The data were provided by the non-profit organization “*Collectif Féministe contre le Viol*” (CFCV)—“*Feminist Collective Against Rape*”, created in 1985 that victims (or their relatives or professionals) can call to get support and information. The calls are free and anonymous, and the hotline is open every weekday from 10 a.m. to 7 p.m. Each hotline employee received an extended training (in the fields of laws, regulations, and psychology) to support the victims. The victims are explicitly told that the information is being conserved in an anonymous file, to be retrieved should the victim call another time (the code is given by the victim herself). The CFCV does not collect any personal data concerning the victims (such as phone number, mail address, IP address, and so on).

During the phone call, the victim gives a name (or pseudo) and a zip code. The listener takes note of the victim’s narrative of the assault and additional background information. The file mentions the date of the call (1st or 2nd call), gender, age at the time of the assault, and ticks the boxes aimed to detail the sexual assault(s):

- *its consequences on the victim’s life*: health consequences, depression, suicide attempt, disordered eating, self-medication, drugs, self-mutilation, impacts on relationships, impact on sexuality, impacts on studies or professional life, and therapies;
- *characteristics of the aggression*: location, by day or night, with drugs or alcohol, violence, threats, weapons, unique, or not;

- *details regarding the attacker(s)*: how many, profession, age, type of situation (extrafamilial, intrafamilial, marital), type of assault (attempt, rape, sexual assault, harassment, gang rape, with ascendance, and other mistreatments), and medical and legal processes following the assault and/or still ongoing.

An additional section for other comments is left blank for any complement to signal or precise a medical condition, a diagnosis that has been given to the victim, a mention of another consequence not listed above, problematic social or living conditions...

The present study was performed by selecting the consecutive files (1 file per victim) filled from January 2014 to June 2018.

Disordered eating (DE) identification and characterization

To get the files of the victims who developed DE, a filter on the selected sample of the database was applied for the variable “anorexia/bulimia” in the medical consequences’ section of the files. An additional filter was applied on the commentary section to screen for mentions of any word on the lexical field of DE (i.e., “eating disorder”, “gain” or “loss of weight”, “eating too much”, “binge eating”, “rejection of food/refusing food”, “digestive troubles”, and “difficulties with eating”).

To further analyze DE and the profile of the victims, each file selected was studied individually for the narrative of the victims and the additional commentary notes.

DE was divided into four categories of eating-related symptoms in reference to the DSM-5 [4]:

- *Restrictive Anorexia (RA)*: this anorexia nervosa (AN) category was obtained by selecting the terms “anorexia”, “fear to eat”, “rapid/severe weight loss”, “too skinny”, “thinness”, or associated terms mentioning an unwanted and/or significant weight loss (with BMI < 17 as it could be frequently calculated from weight and height spontaneously declared by the victims) related to the assault(s), without any mention of purging (vomiting or laxatives use) in the file;
- *Anorexia—Bulimia (AB)*: this category included people from AN category but with a purging behavior mentioned in their file, or those with the terms “anorexia-bulimia” or “bulimia-anorexia”;
- *Hyperphagia/Binge Eating (HBE)*: subjects with terms “binge eating”, “bulimia”, “unwanted weight gain”, and/or those associated to hyperphagia (“eating too much”, “cannot stop eating”, “obesity”, “obese”, “weight gain”, “gastric ring”, or “stomach reduction surgery”) were included in this category;

- *Unspecified DE (UDE)*: any other mention of DE without insufficient specification and detail was classified in this category.

Consequences of sexual assault(s)

To assess the clinical profiles of the victims that developed DE after a sexual assault, several psychological/psychiatric elements were specifically screened.

- *Post-traumatic stress disorder (PTSD)* being a common consequence of aggressions, a first filter was applied in the comments section to screen for the terms “PTSD”, and terms such as: “trauma”, “flashbacks” or “flashes”, “reviviscence”, “nightmares”, “intrusions”, “traumatic amnesia”, “memory loss”, “black out”, “dissociation” as well as mention of depersonalization and derealization (for example “seeing from outside my body”, “does not feel”, “my body does not belong to me anymore”);
- *Anxiety troubles (including phobia and Obsessive Compulsive Disorders: OCD)*: a filter was applied in the comments section to screen for mentions of anxiety disorders “phobia” (agoraphobia, emetophobia...), “fear of ...” (i.e., “fear of falling asleep”, “fear of getting outside”, “fear of men”...), “anxiety”, “OCD” (i.e., “obsessively cleaning hands”), “insomnia”, “anguish”, “hypervigilance”, “panic attacks”;
- *Other psychiatric troubles: suicide attempt, depression, self-mutilation, self-medication and alcoholism*: in the CFCV file, specific boxes to tick are dedicated to each of these situations. To confirm and complete the data provided by the database, a secondary screening of the comments section was performed for mentions of “suicide”, “suicidal ideas”, “suicide attempts”; “depression”; mention of taking medication without medical authorization; mention of self-mutilation; and mention of alcoholism (often expressed as “cannot sleep without drinking”, “drinking problem”, “alcoholic”);
- *Sphincter troubles*: The lecture of the file and narratives of the victims developing DE showed an alarming mention of sphincter related problems. Therefore, a selective filter was applied on the commentary section of the digital file of the victim to screen for mentions of “encopresis”, “enuresis”, “difficulties to urinate/defecate”, “wet the bed”, and “urinary difficulties”.

Type of sexual assault

We assessed the type of the assault(s) (sexual aggression or rape), in accordance with the French current legislation (*sexual aggression*: “any sexual act committed with violence, coercion, threat or surprise” [53]; *rape*: “any act of sexual penetration, whatever its nature, committed on another

person or on the author by force, coercion, threat or surprise constitutes rape” [54]); the individual or collective nature of the rape; the onset of the assault; and the association to other aggressions (burns from cigarettes or else, physical, verbal and psychological abuse, threats, forced sex with animals, etc.). The categories of age at the first assault were: childhood (from 0 to 14 years old included), adolescence (15–17 y.o.), and adulthood (from 18 y.o.).

The type of rape in DE subjects was further described as forced oral, genital, and/or anal sex.

Link with the perpetrator

For all victims (with and without DE), the database records whether the attacker belongs to the family of the victim (intra-family), or not (extra-family), or is the spouse/partner of the victim.

Statistical analyses

They were performed with the software GNU PSPP Statistical Analysis Software (<https://www.gnu.org/software/pspp/>), version 2018 1.2.0-g0fb4db, using the Chi-square test and odds ratio calculation for each (univariate) characteristic (CI 95). For quantitative data (age at the aggression) multivariate analyses, ANOVA, HSD Tukey post hoc tests were performed. In all tests, the significance threshold was $\alpha < 0.05$.

Results

Occurrence of sexual assaults

The files of 12,638 victims of sexual assaults (94.6% of women) were analyzed for this study. Their age at the first assault was 18.6 ± 12.2 years (extreme values: 0–87, median = 16 years, unknown value: 10%).

DE was detected in 546 victims (538 females/8 males). This represents 4.3% of the population of victims. As shown in Fig. 1, the age of the first assault in victims that developed DE was significantly lower (13.3 ± 10.0 years; extreme values: 0–64, median = 12 years, unknown value in 12 files) than that of the whole population ($p < 0.001$).

The victims that developed DE were more assaulted during childhood, by a family member and had a more frequent history of childhood abuse and/or more severe assaults (by groups or with additional physical injuries) (see Table 1).

The distribution of the different types of DE is presented in Table 2. RA was the most frequently reported DE (41% of DE subjects). The median age of the first assault was significantly higher in the RA subgroup than in the AB ($p = 0.02$) and the HBE subgroup ($p = 0.002$). The victims with HBE

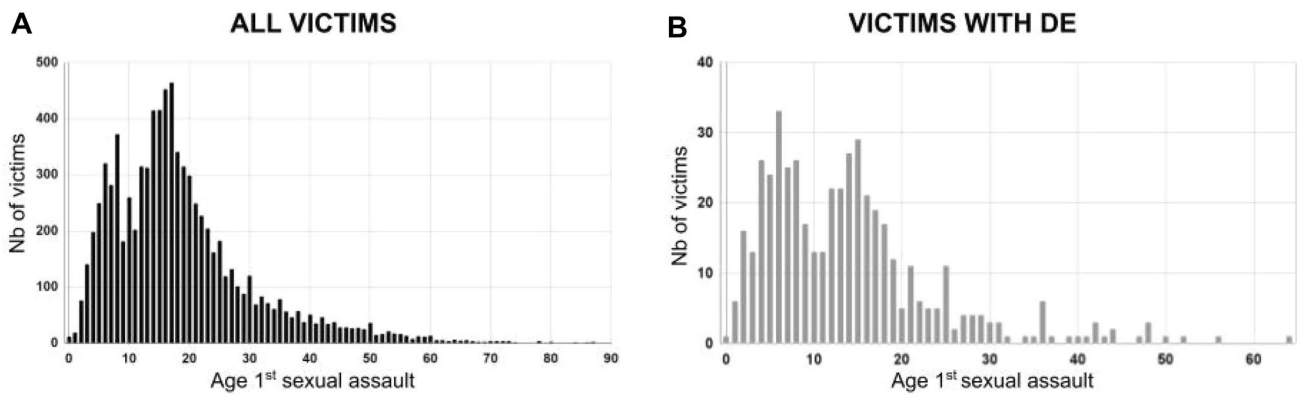


Fig. 1 Distribution in the age of victims at the first sexual assault. Part **A**: all the victims ($n = 12,638$); Part **B**: victims that developed Disordered Eating (DE) ($n = 546$)

Table 1 Differences between the victims with Disordered Eating (DE) and without DE regarding age category at the first assault, the link with the perpetrator, the type of sexual assault, and a history of childhood abuse

	All victims		DE victims		OR	<i>p</i>
	<i>N</i>	%	<i>N</i>	%		
Age category						
Childhood	4620	36.5	324	60.0	2.22 [1.86–2.65]	<0.001
Adolescence	1475	11.6	70	13.0	1.04 [0.80–1.33]	0.79
Adulthood	5299	41.9	138	25.6	0.42 [0.35–0.51]	<0.001
Perpetrator						
Intra-family	3216	25.4	174	32.2	1.34 [1.11–1.61]	0.002
Extra-family	6229	49.2	210	38.8	0.62 [0.52–0.73]	<0.001
Spouse/partner	2228	17.6	95	17.6	0.96 [0.77–1.20]	0.72
Aggression type						
Childhood abuse	793	6.3	89	16.4	2.99 [2.34–3.83]	<0.001
Sexual aggression	2069	16.4	151	27.9	1.98 [1.63–2.41]	<0.001
Rape	6156	48.7	235	43.4	0.81 [0.68–0.96]	0.02
Forced oral sex	ND	ND	79	16.6	ND	
Forced anal sex	ND	ND	40	7.4	ND	
Group assault	818	6.5	79	14.6	2.48 [1.93–3.18]	<0.001
Additional (burns...)	2611	20.6	194	35.4	2.05 [1.71–2.46]	<0.001

DE victims = victims with disordered eating, ND not determined, OR odd ratio [95% confidence interval]

and AB were significantly more assaulted during childhood compared to those with RA ($p = 0.003$).

No significant differences were found between the DE subgroups regarding the perpetrator of the assault or the aggression type, except for sexual aggression that was lower in the UDE subgroup ($p = 0.016$).

Consequences of sexual assault(s)

The victims with DE have a higher prevalence of all psychological troubles assessed in the study compared to victims that did not develop DE (see Table 3).

No significant differences were found regarding the prevalence of the different consequences between the 4 DE

profiles (Table 4), but some tendencies appeared for anxiety being potentially more declared in UDE (28.5% compared to an average of 17.5% of the 3 other groups, $p = 0.07$). Similarly, the victims that developed HBE tended to be less at risk of suicide attempt than the 3 other groups (11.7% versus an average of 22% for the 3 other groups), even though this difference failed to reach significance ($p = 0.09$).

Discussion

The present study aims to further explore the links between DE and self-reported sexual violence, via the characterization of the consequences of an assault on the physical

Table 2 Characteristics of victims according to their disordered eating category

	RA (n=224)	AB (n=73)	HBE (n=111)	UDE (n=130)
% of victims with DE	41.0	13.4	20.3	23.8
% of total victims	1.8	0.6	0.9	1.0
Mean age of first assault	15.9 ± 11.2	11.8 ± 8.3	11.5 ± 6.5	13.9 ± 10.3
Median age of first assault	14	8	12	13
Age category				
Childhood	51.3%	67.1%	69.4%	63.8%
Adolescence	13.4%	9.6%	12.6%	14.6%
Adulthood	33.9%	21.9%	16.2%	20.8%
Perpetrator				
Intra-family	29.9%	37.0%	36.9%	30.0%
Extra-family	41.5%	35.6%	41.4%	33.8%
Spouse/partner	20.5%	12.3%	12.6%	20.0%
Aggression type				
Childhood abuse	14.7%	20.6%	14.4%	14.6%
Sexual aggression	30.4%	38.4%	27.9%	18.5%**
Rape	45.5%	41.1%	49.6%	36.2%
Forced oral sex	13.8%	19.2%	12.6%	23.9%
Forced anal sex	6.3%	6.9%	7.2%	10.0%
Group assault	15.6%	13.7%	11.7%	16.2%
Additional (burns...)	43.7%	43.8%	30.6%	35.4%

RA restrictive anorexia, AB anorexia–bulimia, HBE hyperphagia/binge eating, UDE unspecified disordered eating

** $p=0.016$

Table 3 Different health consequences for victims that developed Disordered Eating (DE)

	All victims		DE victims		OR	<i>p</i>
	<i>N</i>	%	<i>N</i>	%		
PTSD	742	5.9	95	17.6	3.78 [2.99–4.78]	<0.001
Anxiety and associated troubles	677	5.3	109	20.2	5.16 [4.11–6.47]	<0.001
Suicide attempts	712	5.6	104	19.3	4.51 [3.59–5.67]	<0.001
Depression	1753	13.9	243	45.0	5.74 [4.81–6.86]	<0.001
Alcoholism	287	2.3	41	7.6	3.96 [2.81–5.58]	<0.001
Self-medication	297	2.3	53	9.8	5.27 [3.86–7.19]	<0.001
Self-mutilation	180	1.4	57	10.6	11.50 [8.29–15.95]	<0.001
Sphincter troubles	54	0.4	11	2.0	5.97 [3.06–11.67]	<0.001

DE victims = victims with disordered eating, PTSD post-traumatic stress disorder, OR odd ratio [95% CI]

and mental health of victims with DE and those without. It was based on the presence of an association between sexual abuse and a lifetime diagnosis of EDs in a systematic review and meta-analysis (OR: 2.72; 95% CI 2.04–3.63) [55], and is the only study conducted in a large population of sexual victims.

DE prevalence was found to be 4.3% of the studied sample. This prevalence being extracted from declarative data; this number is probably underestimated. For the same reason, the data obtained do not allow a classification of DE in EDs in accordance with the DSM-5 [4], which could

contribute to the absence of any significant differences between the different DE subgroups for some of the variables studied.

We should note that we could not collect the age of the victims, which did not allow us to calculate the time between the sexual abuse and the study. However, about 90% of the callers to the association are adults and about 70% of the callers declare their sexual assault > 1 year before (unpublished data), and the age of the first sexual assault in the present study was mostly before adulthood (see Table 1). The victims with DE having a lower median age at sexual

Table 4 Different health consequences between the four different Disordered Eating profiles

	RA		AB		HBE		UDE		<i>p</i>
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	
PTSD	38	17.0	14	19.2	20	18.0	23	17.7	0.98
Anxiety and associated troubles	40	17.9	13	17.8	19	17.1	37	28.5	0.07
Suicide attempts	46	20.5	19	26.0	13	11.7	25	20.0	0.09
Depression	111	49.6	31	42.5	45	40.5	56	43.1	0.37
Alcoholism	15	6.7	7	9.6	9	8.1	10	7.7	0.87
Self-medication	19	8.5	9	12.3	8	7.2	17	13.1	0.34
Self-mutilation	19	8.5	9	12.3	9	8.1	20	15.4	0.16
Sphincter troubles	3	1.3	4	5.5	2	1.8	3	1.5	0.17

RA restrictive anorexia, *AB* anorexia-bulimia, *HBE* hyperphagia/binge eating, *UDE* unspecified disordered eating, *PTSD* post-traumatic stress disorder

assault than the victims without DE (12 years versus 16 years), even if for some of the victims of the latter group the time between the sexual assault and their call was too short to develop DE, we may hypothesize from these data that DE in the RA subgroup was not a simple and transitory loss of appetite due to the stress of the sexual traumatization and/or gastrointestinal distress, but a real and persistent DE. It is also likely that DE symptoms have been triggered by sexual assault and were not present before, since the first assault was mostly declared in childhood in the DE group. However, from the data in our possession, it cannot be determined whether these symptoms are referable to a real ED such as AN or to a depressed mood or a PTSD.

Our data show an increase of sphincter troubles related to sexual assault, a reported consequence of sexual abuse with frequent somatoform symptoms, especially when PTSD is present [41]. They can appear as common clinical symptoms (secondary enuresis, overactive bladder, dysuria, urinary retention, etc.) or sometimes as neurogenic bladder [56].

Among the four types of DE, RA was more frequently detected (41%). This is concordant with a previous study performed in the same country on hospitalized EDs' patients in which a PTSD was found to be present in 33.9% [40]. However, other studies conducted, respectively, on female teenagers and adults with anorexia nervosa [37, 57] and two meta-analyses assessing the association between distinct types of child abuse and different EDs have shown that only BN and BED are significantly associated with sexual abuse [22, 58].

These discrepancies for relationship between traumatic event and ED types could be explained by the differences in the type of traumatic events and/or their exposure duration. A recent study in a clinical sample of patients with an ED has indeed found that sexual abuse is less present in RA than in AB or BN groups, but patients in the RA group report extreme sexual assault more often than any of the other ED groups [59]. ED patients with PTSD

have been reported to have a greater propensity toward binge-type EDs [42]. In the multicentric study of Reyes-Rodriguez et al. on PTSD in anorexia nervosa, the prevalence of PTSD in ED victims of sexual assaults was higher than that of victims of other traumatic events [57]. In that study, as in the present one, PTSD prevalence did not differ between RA and AB subgroups. Otherwise, Vidana et al. [34] reported more purging behaviors in victims with traumatic events occurring in both childhood and adulthood than at each period of age.

Another explanation to the above discrepancies might be a greater ability to repress trauma in RA subjects whose cognitive strategy induces emotion avoidance and a deficit in the perception of self and one's own feelings [60, 61]. Alterations in autobiographical memory especially for negative events have also been reported in AN [62, 63].

DE induced by a traumatic event should thus be considered as a means to counteract emotional dysregulation, or an attempt to alleviate symptoms of PTSD, regardless of the origin of the trauma [64, 65]. When internal schemas for safety are disrupted, food may indeed serve as a transitional object, since food encompasses a symbolic significance while providing emotional comfort. Fasting and binge eating can then be used to create mood alteration that can compensate for the devastating effect of the trauma. In accordance with the narratives reported by the victims of our study, RA could be used as a way of re-taking control and feeling a power that has been taken from the victim, while bingeing is a response of the urge to fill up to forget, a filling that can be put back (BN) to ward off the pain [66]. Interventions focused on improving emotional functioning seem to be especially beneficial for DE patients with trauma histories [67–69].

DE co-occur frequently with PTSD, especially in BN [70]. High levels of PTSD have been reported in subjects with EDs, and EDs are more present in subjects with PTSD [39, 71]. In children with authenticated childhood

maltreatment, PTSD and dissociative symptoms were significant predictors of DE [72].

Moreover, as several studies reported more severe EDs whatever their type in the presence of PTSD [42, 73, 74], our data tend to confirm those of Holzer et al. [75] and of Dubosc et al. [76], suggesting that severe traumatic events and PTSD, especially in childhood, are in fact a causal factor of ED occurrence.

A significant association between sexual abuse and a lifetime diagnosis of anxiety disorder, depression, PTSD, and suicide attempts has been established for several decades in the scientific literature [27, 29, 77], and seems to persist regardless of the victim's gender or age at which abuse occurred [55]. Suicide attempts were present in 19.3% of DE subjects in the present study, whereas they were previously reported to occur in approximately 3–20% of patients with anorexia nervosa and in 25–35% of patients with bulimia nervosa, and a significant clinical correlate of suicidality was a history of childhood physical and/or sexual abuse [78]. Contrary to some other studies showing a positive association between purging and suicidality [79, 80], the rates of suicide attempts in our study do not significantly differ between the RA and AB subgroups. We therefore recommend a systematic assessment of suicidal ideation, regardless of the type of DE, especially when a PTSD is present. However, considering the high prevalence of depression in DE subjects victim of sexual violence (45% in our study), this assessment should be performed even in the absence of PTSD.

Apart from being a causal factor of suicide attempts, childhood sexual abuse is a well-established risk factor for non-suicidal self-injury (NSSI) and was reported to be significantly associated to ED [81]. The observed lifetime prevalence of NSSI is 20.9% in women and is not associated with an ED type and EDs associated with NSSI are more severe, and general psychopathological symptoms are more frequent [82]. In our sample, the association between NSSI and DE was quite strong with an OR of 11.50 [8.29–15.95], and it did not differ between the DE subgroups, thus confirming the previous data on the matter. Emotion dysregulation has been proposed as a causal factor of NSSI [83], and is a well-known consequence of trauma, as traumatic event impact cortisol and norepinephrine response, medial prefrontal cortex and amygdala functioning, and the hypothalamic–pituitary–adrenal (HPA) axis which are crucial areas in emotional processing and regulation (as well as other part of the former limbic system) [84]. It is well known that these PTSD-induced neurological modifications are even more long lasting when the trauma occurs in infancy or childhood [84].

A higher prevalence of alcoholism in the DE subjects is also concordant with previous data, showing that ED and substance use disorders commonly co-occur [85]. Alcohol

and substance use has been very well described in the literature of PTSD patients and sexual assault survivors as a coping mechanism or self-medication after a trauma, and even more so if it happened in childhood [86–90]. In a population-based sample of 1,411 female adult twins, self-reported childhood sexual abuse was positively associated with a number of psychiatric disorders, but the strongest associations were with alcohol and drug dependence, as well as bulimia [91]. In this framework, it has been hypothesized that drugs are used to prolongate the dissociative effect of the trauma, counteract emotional dysregulation, numb recurrent traumatic recollections of the event, and/or allow fall asleep fast and avoid associated nightmares [92, 93].

An emerging concept integrates EDs into the field of addictions [94–96], these behaviors representing maladaptive coping strategies, which may offer a distraction from aversive emotional arousal [97]. This could thus explain the recent discovery of a shared genetic risk between eating disorder- and substance-use-related phenotypes [98]. Recent findings in animal literature outline similar neurological signatures between overeating/BED and substance addiction [99].

No differences were found between DE subtypes, whereas a discrepancy between ED subtypes is reported in human literature, with BED being more associated with alcoholism and substance abuse than RA [21]. This could be explained by the fact that our data were extracted from declarative data that did not specifically screen for either ED or substance abuse, or could be impacted by the stigma associated with both EDs and substance addictions. Another explanation could be that the occurrence of sexual assault is not taken into consideration in many studies on EDs, which could be a confounding factor in this case. Nonetheless, a co-occurrence of ED and substance abuse should alert the professional to the existence of possible past or still ongoing sexual violence in the patient.

Strength and limits

This study is to our knowledge the only study to investigate DE within a large cohort of victims of sexual violence and to analyze the consequences of sexual assaults by taking into account the presence of DE.

The main limits of the present study are due to the declarative nature of the data and the absence of systematic questioning on eating behavior, which did not allow a precise assessment of the number and type of EDs. In particular, it cannot be determined whether DE symptoms are referable to a real ED such as AN or to a depressed mood or a PTSD.

The conditions used by the association receiving the victims' calls do not allow temporal data collection: when and how long after the sexual assault DE occurred, and the eating-related attitudes prior to the assault.

Conclusion

Beyond the consequences of sexual assault on mental health, in coherence with the literature [29, 100], this study confirms the strong link between DE and self-reported sexual violence in childhood, leading to trauma responses with high risk of anxiety disorders, depression, suicide attempts, and substance use. The victims that develop DE also more frequently present a PTSD. We thus suggest that, in the context of sexual violence, DE should be envisaged as a self-regulatory coping strategy accompanying emotional dysregulation due to those traumatic events, and be treated as such by clinicians. Consequently, we recommend that a history of sexual violence should be systematically suspected when an ED is associated with somatoform symptoms, multiple psychiatric comorbidities, or resistance to recovery.

What is already known on this subject?

A link between EDs and sexual violence has been demonstrated in the scientific literature, but sexual trauma is largely underdiagnosed despite its important impact on ED treatment.

The exploration of DE in a large sample of sexual victims would contribute to a better identification of subjects developing DE as consequence of assault(s) and thus to a more adapted treatment.

What does this study add?

Victims of sexual violence developing DE have more frequently been assaulted in childhood and present more severe psychological consequences than victims without DE.

A history of sexual violence must be systematically suspected in a patient with an ED associated with somatoform symptoms, multiple psychiatric comorbidities, or resistance to recovery.

Acknowledgements We wish to thank Gabriela Bravo and the whole team of Collectif Féministe Contre le Viol for providing the data for this study and Sylvie Ricord for linguistic assistance.

Author contributions Study initiation: DB-W; provision of data: EP (president of the non-profit organization “Collectif Féministe Contre le Viol”); study design: AM-K, DB-W, and EB; analysis: AM-K; writing the manuscript and critical comments to the drafts: AM-K and EB. All authors read and approved the final manuscript.

Funding This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data availability The datasets generated for this study are available on request to the corresponding author.

Code availability N/A.

Declarations

Conflict of interest The authors report none conflict of interest.

Ethical approval The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. As the calls to hotline are fully anonymous and the name of the victims is neither asked nor written, no approval by a specific ethical committee was required (in accordance with the EU regulation 2016/679, article 9 2.j of the General Data Protection Regulation).

Consent to participate N/A (the calls from the victims are spontaneous and free, their phone number is not visible to the listeners, and no additional collection of data was needed for this study).

Consent for publication N/A.

References

- Schmidt U, Adan R, Böhm I, Campbell IC, Dingemans A, Ehrlich S et al (2016) Eating disorders: the big issue. *Lancet Psychiatry* 3(4):313–315. [https://doi.org/10.1016/S2215-0366\(16\)00081-X](https://doi.org/10.1016/S2215-0366(16)00081-X)
- Udo T, Grilo CM (2019) Psychiatric and medical correlates of DSM-5 eating disorders in a nationally representative sample of adults in the United States. *Int J Eat Disord* 52(1):42–50. <https://doi.org/10.1002/eat.23004>
- Arcelus J, Mitchell AJ, Wales J, Nielsen S (2011) Mortality rates in patients with anorexia nervosa and other eating disorders. A meta-analysis of 36 studies. *Arch Gen Psychiatry* 68(7):724–731. <https://doi.org/10.1001/archgenpsychiatry.2011.74>
- APA (2013) Diagnostic and statistical manual of mental disorders (DSM-5®), 5 edn. p. 991
- Striegel-Moore RH, Rosselli F, Perrin N, DeBar L, Wilson GT, May A, Kraemer HC (2009) Gender difference in the prevalence of eating disorder symptoms. *Int J Eat Disord* 42(5):471–474. <https://doi.org/10.1002/eat.20625>
- Treasure J, Duarte TA, Schmidt U (2020) Eating disorders. *Lancet* 395(10227):899–911. [https://doi.org/10.1016/S0140-6736\(20\)30059-3](https://doi.org/10.1016/S0140-6736(20)30059-3)
- Hilbert A, Hoek HW, Schmidt R (2017) Evidence-based clinical guidelines for eating disorders: international comparison. *Curr Opin Psychiatry* 30(6):423–437. <https://doi.org/10.1097/YCO.0000000000000360>
- Munro C, Randell L, Lawrie SM (2017) An integrative bio-psycho-social theory of anorexia nervosa. *Clin Psychol Psychother* 24(1):1–21. <https://doi.org/10.1002/cpp.2047>
- Hemmingsson E (2018) Early childhood obesity risk factors: socioeconomic adversity, family dysfunction, offspring distress, and junk food self-medication. *Curr Obes Rep* 7(2):204–209. <https://doi.org/10.1007/s13679-018-0310-2>
- Ravichandran S, Bhatt RR, Pandit B, Osadchiy V, Alaverdyan A, Vora P, Stains J, Naliboff B, Mayer EA, Gupta A (2021) Alterations in reward network functional connectivity are associated with increased food addiction in obese individuals. *Sci Rep* 11(1):3386. <https://doi.org/10.1038/s41598-021-83116-0>

11. Carbone EA, D'Amato P, Vicchio G, De Fazio P, Segura-Garcia C (2020) A systematic review on the role of microbiota in the pathogenesis and treatment of eating disorders. *Eur Psychiatry* 64(1):e2. <https://doi.org/10.1192/j.eurpsy.2020.109>
12. Himmerich H, Bentley J, Kan C, Treasure J (2019) Genetic risk factors for eating disorders: an update and insights into pathophysiology. *Ther Adv Psychopharmacol* 12(9):2045125318814734. <https://doi.org/10.1177/2045125318814734>
13. Cardi V, Di Matteo R, Corfield F, Treasure J (2013) Social reward and rejection sensitivity in eating disorders: an investigation of attentional bias and early experiences. *World J Biol Psychiatry* 14(8):622–633. <https://doi.org/10.3109/15622975.2012.665479>
14. Lloyd EC, Sallis HM, Verplanken B, Haase AM, Munafò MR (2020) Understanding the nature of association between anxiety phenotypes and anorexia nervosa: a triangulation approach. *BMC Psychiatry* 20(1):495. <https://doi.org/10.1186/s12888-020-02883-8>
15. Garcia SC, Mikhail ME, Keel PK, Burt SA, Neale MC, Boker S, Klump KL (2020) Increased rates of eating disorders and their symptoms in women with major depressive disorder and anxiety disorders. *Int J Eat Disord* 53(11):1844–1854. <https://doi.org/10.1002/eat.23366>
16. Martín J, Arostegui I, Loroño A, Padierna A, Najera-Zuloaga J, Quintana JM (2019) Anxiety and depressive symptoms are related to core symptoms, general health outcome, and medical comorbidities in eating disorders. *Eur Eat Disord Rev* 27(6):603–613. <https://doi.org/10.1002/erv.2677>
17. Thomas R, Siliquini R, Hillegers MH, Jansen PW (2020) The association of adverse life events with children's emotional overeating and restrained eating in a population-based cohort. *Int J Eat Disord* 53(10):1709–1718. <https://doi.org/10.1002/eat.23351>
18. Wiss DA, Brewerton TD (2020) Adverse childhood experiences and adult obesity: a systematic review of plausible mechanisms and meta-analysis of cross-sectional studies. *Physiol Behav* 1(223):112964. <https://doi.org/10.1016/j.physbeh.2020.112964>
19. Grogan K, MacGarry D, Bramham J, Scriven M, Maher C, Fitzgerald A (2020) Family-related non-abuse adverse life experiences occurring for adults diagnosed with eating disorders: a systematic review. *J Eat Disord* 22(8):36. <https://doi.org/10.1186/s40337-020-00311-6>
20. Smyth JM, Heron KE, Wonderlich SA, Crosby RD, Thompson KM (2008) The influence of reported trauma and adverse events on eating disturbance in young adults. *Int J Eat Disord* 41(3):195–202. <https://doi.org/10.1002/eat.20490>
21. Bartlett BA, Iverson KM, Mitchell KS (2018) Intimate partner violence and disordered eating among male and female veterans. *Psychiatry Res* 260:98–104. <https://doi.org/10.1016/j.psychres.2017.11.056>
22. Molendijk ML, Hoek HW, Brewerton TD, Elzinga BM (2017) Childhood maltreatment and eating disorder pathology: a systematic review and dose-response meta-analysis. *Psychol Med* 19:1–15. <https://doi.org/10.1017/S0033291716003561>
23. World Health Organization (2002) World report on violence and health, chap.6, p.148–181
24. Estimating the Incidence of Rape and Sexual Assault [Internet] (2014) Washington, D.C.: National Academies Press. Doi: <https://doi.org/10.17226/18605>. Accessed 21 Jul 2021
25. Kilimnik CD, Meston CM (2019) Sexual violence identification and women's sexual well-being. *Curr Sex Health Rep* 11(1):1–8. <https://doi.org/10.1007/s11930-019-00186-y>
26. Pulverman CS, Kilimnik CD, Meston CM (2018) The impact of childhood sexual abuse on women's sexual health: a comprehensive review. *Sex Med Rev* 6(2):188–200. <https://doi.org/10.1016/j.sxmr.2017.12.002>
27. Banvard-Fox C, Linger M, Paulson DJ, Cottrell L, Davidov DM (2020) Sexual assault in adolescents. *Prim Care* 47(2):331–349. <https://doi.org/10.1016/j.pop.2020.02.010>
28. Mgoqi-Mbalo N, Zhang M, Ntuli S (2017) Risk factors for PTSD and depression in female survivors of rape. *Psychol Trauma* 9(3):301–308. <https://doi.org/10.1037/tra0000228>
29. Dworkin ER, Menon SV, Bystrynski J, Allen NE (2017) Sexual assault victimization and psychopathology: a review and meta-analysis. *Clin Psychol Rev* 56:65–81. <https://doi.org/10.1016/j.cpr.2017.06.002>
30. Mitchell KS, Mazzeo SE, Schlesinger MR, Brewerton TD, Smith BN (2012) Comorbidity of partial and subthreshold PTSD among men and women with eating disorders in the national comorbidity survey-replication study. *Int J Eat Disord* 45(3):307–315. <https://doi.org/10.1002/eat.20965>
31. Forman-Hoffman VL, Mengeling M, Booth BM, Torner J, Sadler AG (2012) Eating disorders, post-traumatic stress, and sexual trauma in women veterans. *Mil Med* 177(10):1161–1168. <https://doi.org/10.7205/milmed-d-12-00041>
32. Burgess AW, Holmstrom LL (1974) Rape trauma syndrome. *Am J Psychiatry* 131(9):981–986. <https://doi.org/10.1176/ajp.131.9.981>
33. Wonderlich SA, Crosby RD, Mitchell JE, Thompson KM, Redlin J, Demuth G, Smyth J, Haseltine B (2001) Eating disturbance and sexual trauma in childhood and adulthood. *Int J Eat Disord* 30(4):401–412. <https://doi.org/10.1002/eat.1101>
34. Vidaña AG, Forbush KT, Barnhart EL, Mildrum Chana S, Chapa DAN, Richson B, Thomeczek ML (2020) Impact of trauma in childhood and adulthood on eating-disorder symptoms. *Eat Behav* 39:101426. <https://doi.org/10.1016/j.eatbeh.2020.101426>
35. Nunes-Neto PR, Köhler CA, Schuch FB, Solmi M, Quevedo J, Maes M, Murru A, Vieta E, McIntyre RS, McElroy SL, Gearhardt AN, Stubbs B, Carvalho AF (2018) Food addiction: prevalence, psychopathological correlates and associations with quality of life in a large sample. *J Psychiatr Res* 96:145–152. <https://doi.org/10.1016/j.jpsychires.2017.10.003>
36. Palmisano GL, Innamorati M, Susca G, Traetta D, Sarracino D, Vanderlinden J (2018) Childhood traumatic experiences and dissociative phenomena in eating disorders: level and association with the severity of binge eating symptoms. *J Trauma Dissociation* 19(1):88–107. <https://doi.org/10.1080/15299732.2017.1304490>
37. Groff Stephens S, Wilke DJ (2016) Sexual violence, weight perception, and eating disorder indicators in college females. *J Am Coll Health* 64(1):38–47. <https://doi.org/10.1080/07448481.2015.1074237>
38. Gleaves DH, Eberenz KP, May MC (1998) Scope and significance of posttraumatic symptomatology among women hospitalized for an eating disorder. *Int J Eat Disord* 24(2):147–156. [https://doi.org/10.1002/\(sici\)1098-108x\(199809\)24:2%3c147::aid-eat4%3e3.0.co;2-e](https://doi.org/10.1002/(sici)1098-108x(199809)24:2%3c147::aid-eat4%3e3.0.co;2-e)
39. Strickler L, H. (2013) The interaction between post-traumatic stress disorders and eating disorders: a review of relevant literature. *Trauma Treat*. <https://doi.org/10.4172/2167-1222.1000183>
40. Vierling V, Etori S, Valenti L, Lesage M, Pigeire M, Dodin V, Cottencin O, Guardia D (2015) Prévalence et impact de l'état de stress post-traumatique chez les patients atteints de troubles du comportement alimentaire [Prevalence and impact of post-traumatic stress disorder in a disordered eating population sample]. *Presse Med* 44(11):e341–e352. <https://doi.org/10.1016/j.lpm.2015.04.039> (French)
41. Tagay S, Schlegl S, Senf W (2010) Traumatic events, posttraumatic stress symptomatology and somatoform symptoms in eating disorder patients. *Eur Eat Disord Rev* 18(2):124–132. <https://doi.org/10.1002/erv.972>

42. Brewerton TD, Perlman MM, Gavidia I, Suro G, Genet J, Bunnell DW (2020) The association of traumatic events and posttraumatic stress disorder with greater eating disorder and comorbid symptom severity in residential eating disorder treatment centers. *Int J Eat Disord* 53(12):2061–2066. <https://doi.org/10.1002/eat.23401>
43. Rodríguez M, Pérez V, García Y (2005) Impact of traumatic experiences and violent acts upon response to treatment of a sample of Colombian women with eating disorders. *Int J Eat Disord* 37(4):299–306. <https://doi.org/10.1002/eat.20091>
44. Trottier K (2020) Posttraumatic stress disorder predicts non-completion of day hospital treatment for bulimia nervosa and other specified feeding/eating disorder. *Eur Eat Disord Rev* 28(3):343–350. <https://doi.org/10.1002/erv.2723>
45. Castellini G, Lelli L, Cassioli E, Ciampi E, Zamponi F, Campone B, Monteleone AM, Ricca V (2018) Different outcomes, psychopathological features, and comorbidities in patients with eating disorders reporting childhood abuse: a 3-year follow-up study. *Eur Eat Disord Rev* 26(3):217–229. <https://doi.org/10.1002/erv.2586>
46. Serra R, Kiekens G, Tarsitani L, Vrieze E, Bruffaerts R, Loredio C, An A, Vanderlinden J (2020) The effect of trauma and dissociation on the outcome of cognitive behavioural therapy for binge eating disorder: a 6-month prospective study. *Eur Eat Disord Rev* 28(3):309–317. <https://doi.org/10.1002/erv.2722>
47. Brewerton TD (2007) Eating disorders, trauma, and comorbidity: focus on PTSD. *Eat Disord* 15(4):285–304. <https://doi.org/10.1080/10640260701454311>
48. Horowitz M, Reidbord S (1993) Memory, emotion and response to trauma. In: Christianson S (ed) *Handbook of emotion and memory*. Psychology Press, Stockholm
49. Van der Kolk BA (1994) The body keeps the score: memory and the evolving psychobiology of posttraumatic stress. *Harv Rev Psychiatry* 1(5):253–265. <https://doi.org/10.3109/10673229409017088>
50. Markowitsch HJ, Staniloiu A (2016) Functional (dissociative) retrograde amnesia. *Handb Clin Neurol* 139:419–445. <https://doi.org/10.1016/B978-0-12-801772-2.00036-9>
51. Dodier O, Patihis L, Payoux M (2019) Reports of recovered memories of childhood abuse in therapy in France. *Memory* 27(9):1283–1298. <https://doi.org/10.1080/09658211.2019.1652654>
52. Alberini CM, Travaglia A (2017) Infantile amnesia: a critical period of learning to learn and remember. *J Neurosci* 37(24):5783–5795. <https://doi.org/10.1523/JNEUROSCI.0324-17.2017>
53. Article 222.22. Code Pénal. Apr 21, 2021. https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000043409030/
54. Article 222.23. Code Pénal. Apr 21, 2021. https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000037289535/
55. Chen LP, Murad MH, Paras ML, Colbenson KM, Sattler AL, Goranson EN, Elamin MB, Seime RJ, Shinozaki G, Prokop LJ, Zirakzadeh A (2010) Sexual abuse and lifetime diagnosis of psychiatric disorders: systematic review and meta-analysis. *Mayo Clin Proc* 85(7):618–629. <https://doi.org/10.4065/mcp.2009.0583>
56. Le Fort M, Labat J-J, Rigaud J (2006) Troubles vésico-sphinctériens et abus sexuel. *Pelvi-périnéologie*. 1(3):285–9. http://www.sifud-pp.org/rc/com/sifud-pp/htm/Article/2010/htm-20100108-134316-098/src/htm_fullText/fr/abstract-book2006.pdf
57. Reyes-Rodríguez ML, Von Holle A, Ulman TF, Thornton LM, Klump KL, Brandt H, Crawford S, Fichter MM, Halmi KA, Huber T, Johnson C, Jones I, Kaplan AS, Mitchell JE, Strober M, Treasure J, Woodside DB, Berrettini WH, Kaye WH, Bulik CM (2011) Posttraumatic stress disorder in anorexia nervosa. *Psychosom Med* 73(6):491–497. <https://doi.org/10.1097/PSY.0b013e31822232bb>
58. Caslini M, Bartoli F, Crocamo C, Dakanalis A, Clerici M, Carrà G (2016) Disentangling the association between child abuse and eating disorders: a systematic review and meta-analysis. *Psychosom Med* 78(1):79–90. <https://doi.org/10.1097/PSY.0000000000000233>
59. Kjaersdam Telléus G, Lauritsen MB, Rodrigo-Domingo M (2021) Prevalence of various traumatic events including sexual trauma in a clinical sample of patients with an eating disorder. *Front Psychol* 19(12):687452. <https://doi.org/10.3389/fpsyg.2021.687452>
60. Geller J, Cockell SJ, Hewitt PL, Goldner EM, Flett GL (2000) Inhibited expression of negative emotions and interpersonal orientation in anorexia nervosa. *Int J Eat Disord* 28(1):8–19. [https://doi.org/10.1002/1098-108x\(200007\)28:1%3c8::aid-eat2%3e3.0.co;2-u.Erratum.In:IntJEatDisord28\(4\):481](https://doi.org/10.1002/1098-108x(200007)28:1%3c8::aid-eat2%3e3.0.co;2-u.Erratum.In:IntJEatDisord28(4):481)
61. Bydlowski S, Corcos M, Jeammet P, Paterniti S, Berthoz S, Laurier C, Chambry J, Consoli SM (2005) Emotion-processing deficits in eating disorders. *Int J Eat Disord* 37(4):321–329. <https://doi.org/10.1002/eat.20132>
62. Brockmeyer T, Grosse Holtforth M, Bents H, Herzog W, Friederich HC (2013) Lower body weight is associated with less negative emotions in sad autobiographical memories of patients with anorexia nervosa. *Psychiatry Res* 210(2):548–552. <https://doi.org/10.1016/j.psychres.2013.06.024>
63. Bomba M, Marfone M, Brivio E, Oggiano S, Broggi F, Neri F, Nacinovich R (2014) Autobiographical memory in adolescent girls with anorexia nervosa. *Eur Eat Disord Rev* 22(6):479–486. <https://doi.org/10.1002/erv.2321>
64. Fischer S, Stojek M, Hartzell E (2010) Effects of multiple forms of childhood abuse and adult sexual assault on current eating disorder symptoms. *Eat Behav* 11(3):190–192. <https://doi.org/10.1016/j.eatbeh.2010.01.001>
65. Michopoulos V, Powers A, Moore C, Villarreal S, Ressler KJ, Bradley B (2015) The mediating role of emotion dysregulation and depression on the relationship between childhood trauma exposure and emotional eating. *Appetite* 91:129–136. <https://doi.org/10.1016/j.appet.2015.03.036>
66. Juli M (2015) Can violence cause eating disorders? *Psychiatr Danub Suppl* 1(27):336–338
67. Haynos AF, Fruzzetti AE (2011) Anorexia nervosa as a disorder of emotion dysregulation: evidence and treatment implications. *Clin Psychol Sci Pract* 18(3):183–202. <https://doi.org/10.1111/j.1468-2850.2011.01250.x>
68. Monell E, Clinton D, Birgegård A (2018) Emotion dysregulation and eating disorders—associations with diagnostic presentation and key symptoms. *Int J Eat Disord* 51(8):921–930. <https://doi.org/10.1002/eat.22925>
69. Bourdier L, Fatseas M, Maria AS, Carre A, Berthoz S (2020) The psycho-affective roots of obesity: results from a french study in the general population. *Nutrients* 12(10):2962. <https://doi.org/10.3390/nu12102962>
70. Mitchell KS, Scioli ER, Galovski T, Belfer PL, Cooper Z (2021) Posttraumatic stress disorder and eating disorders: maintaining mechanisms and treatment targets. *Eat Disord* 7:1–15. <https://doi.org/10.1080/10640266.2020.1869369>
71. van der Kolk BA (2005) Developmental trauma disorder: toward a rational diagnosis for children with complex trauma histories. *Psychiatr Ann* 35(5):401–408. <https://doi.org/10.3928/00485713-20050501-06>
72. Brewerton TD, Ralston ME, Dean M, Hand S, Hand L (2020) Disordered eating attitudes and behaviors in maltreated children and adolescents receiving forensic assessment in a child advocacy center. *J Child Sex Abus* 29(7):769–787. <https://doi.org/10.1080/10538712.2020.1809047>
73. Palmisano GL, Innamorati M, Vanderlinden J (2016) Life adverse experiences in relation with obesity and binge eating disorder:

- a systematic review. *J Behav Addict* 5(1):11–31. <https://doi.org/10.1556/2006.5.2016.018>
74. Scharff A, Ortiz SN, Forrest LN, Smith AR (2021) Comparing the clinical presentation of eating disorder patients with and without trauma history and/or comorbid PTSD. *Eat Disord* 29(1):88–102. <https://doi.org/10.1080/10640266.2019.1642035>
 75. Holzer SR, Uppala S, Wonderlich SA, Crosby RD, Simonich H (2008) Mediation significance of PTSD in the relationship of sexual trauma and eating disorders. *Child Abuse Negl* 32(5):561–566. <https://doi.org/10.1016/j.chiabu.2007.07.011>
 76. Dubosc A, Capitaine M, Franko DL, Bui E, Brunet A, Chabrol H, Rodgers RF (2012) Early adult sexual assault and disordered eating: the mediating role of posttraumatic stress symptoms. *J Trauma Stress* 25(1):50–56. <https://doi.org/10.1002/jts.21664>
 77. Mason F, Lodrick Z (2013) Psychological consequences of sexual assault. *Best Pract Res Clin Obstet Gynaecol* 27(1):27–37. <https://doi.org/10.1016/j.bpobgyn.2012.08.015>
 78. Franko DL, Keel PK (2006) Suicidality in eating disorders: occurrence, correlates, and clinical implications. *Clin Psychol Rev* 26(6):769–782. <https://doi.org/10.1016/j.cpr.2006.04.001>
 79. Bodell LP, Joiner TE, Keel PK (2013) Comorbidity-independent risk for suicidality increases with bulimia nervosa but not with anorexia nervosa. *J Psychiatr Res* 47(5):617–621. <https://doi.org/10.1016/j.jpsychires.2013.01.005>
 80. Smith AR, Zuromski KL, Dodd DR (2018) Eating disorders and suicidality: what we know, what we don't know, and suggestions for future research. *Curr Opin Psychol* 22:63–67. <https://doi.org/10.1016/j.copsyc.2017.08.023>
 81. Steine IM, Nielsen B, Porter PA, Krystal JH, Winje D, Grønli J, Milde AM, Bjorvatn B, Nordhus IH, Pallesen S (2020) Predictors and correlates of lifetime and persistent non-suicidal self-injury and suicide attempts among adult survivors of childhood sexual abuse. *Eur J Psychotraumatol* 11(1):1815282. <https://doi.org/10.1080/20008198.2020.1815282>
 82. Islam MA, Steiger H, Jimenez-Murcia S, Israel M, Granero R, Agüera Z, Castro R, Sánchez I, Riesco N, Menchón JM, Fernández-Aranda F (2015) Non-suicidal self-injury in different eating disorder types: relevance of personality traits and gender. *Eur Eat Disord Rev* 23(6):553–560. <https://doi.org/10.1002/erv.2374>
 83. Hovrud L, Simons R, Simons J, Korkow J (2020) Non-suicidal self-injury and bulimia: the role of emotion dysregulation and body dissatisfaction. *Eat Weight Disord* 25(4):1089–1097. <https://doi.org/10.1007/s40519-019-00741-5>
 84. Bremner JD (2003) Long-term effects of childhood abuse on brain and neurobiology. *Child Adolesc Psychiatr Clin N Am* 12(2):271–292. [https://doi.org/10.1016/s1056-4993\(02\)00098-6](https://doi.org/10.1016/s1056-4993(02)00098-6)
 85. Killeen TK, Brewerton TD, Campbell A, Cohen L, Hien D (2014) Substance use severity and eating disorder symptoms in women with comorbid PTSD and SD. *Can J Addict* 5(2):30
 86. Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB (1995) Posttraumatic stress disorder in the national comorbidity survey. *Arch Gen Psychiatry* 52(12):1048–1060. <https://doi.org/10.1001/archpsyc.1995.03950240066012>
 87. Stewart SH, Pihl RO, Conrod PJ, Dongier M (1998) Functional associations among trauma, PTSD, and substance-related disorders. *Addict Behav* 23(6):797–812. [https://doi.org/10.1016/s0306-4603\(98\)00070-7](https://doi.org/10.1016/s0306-4603(98)00070-7)
 88. Jacobsen LK, Southwick SM, Kosten TR (2001) Substance use disorders in patients with posttraumatic stress disorder: a review of the literature. *Am J Psychiatry* 158(8):1184–1190. <https://doi.org/10.1176/appi.ajp.158.8.1184>
 89. Brady K, Back S (2012) Childhood trauma, posttraumatic stress disorder, and alcohol dependence. *Alcohol Res* 34(4):408–413
 90. Guinle MIB, Sinha R (2020) The role of stress, trauma, and negative affect in alcohol misuse and alcohol use disorder in women. *Alcohol Res* 40(2):05. <https://doi.org/10.35946/arc.v40.2.05>
 91. Kendler KS, Bulik CM, Silberg J, Hettema JM, Myers J, Prescott CA (2000) Childhood sexual abuse and adult psychiatric and substance use disorders in women: an epidemiological and cotwin control analysis. *Arch Gen Psychiatry* 57(10):953–959. <https://doi.org/10.1001/archpsyc.57.10.953>
 92. Ouimette P, Read JP, Wade M, Tirone V (2010) Modeling associations between posttraumatic stress symptoms and substance use. *Addict Behav* 35(1):64–67. <https://doi.org/10.1016/j.addbeh.2009.08.009>
 93. Flanagan JC, Korte KJ, Killeen TK, Back SE (2016) Concurrent treatment of substance use and PTSD. *Curr Psychiatry Rep* 18(8):70. <https://doi.org/10.1007/s11920-016-0709-y>
 94. Coniglio KA, Christensen KA, Haynos AF, Rienecke RD, Selby EA (2019) The posited effect of positive affect in anorexia nervosa: advocating for a forgotten piece of a puzzling disease. *Int J Eat Disord* 52(9):971–976. <https://doi.org/10.1002/eat.23147>
 95. Schulte EM, Gearhardt AN (2021) Attributes of the food addiction phenotype within overweight and obesity. *Eat Weight Disord* 26(6):2043–2049. <https://doi.org/10.1007/s40519-020-01055-7>
 96. Tran H, Poinot P, Guillaume S, Delaunay D, Bernetiere M, Bégin C, Fournier P, Peretti N, Iceta S (2020) Food addiction as a proxy for anorexia nervosa severity: new data based on the Yale Food Addiction Scale 2.0. *Psychiatry Res* 293:113472. <https://doi.org/10.1016/j.psychres.2020.113472>
 97. Meule A, Richard A, Schnepfer R, Reichenberger J, Georgii C, Naab S, Voderholzer U, Blechert J (2019) Emotion regulation and emotional eating in anorexia nervosa and bulimia nervosa. *Eat Disord* 25:1–17. <https://doi.org/10.1080/10640266.2019.1642036>
 98. Munn-Chernoff MA, Baker JH (2017) Shared genetic risk with other psychiatric disorders. In: *Encyclopedia of feeding and eating disorders* [Internet]. Springer, Singapore. Doi: https://doi.org/10.1007/978-981-287-104-6_184
 99. Novelle MG, Diéguez C (2018) Food addiction and binge eating: lessons learned from animal models. *Nutrients* 10(1):71. <https://doi.org/10.3390/nu10010071>
 100. Committee opinion no. 498 (2011) Adult manifestations of childhood sexual abuse. *Obstet Gynecol* 118(2 Pt 1):392–395. <https://doi.org/10.1097/AOG.0b013e31822c994d>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.