

# Eating disorders as a repercussion of sexual assault, a consequence to consider

**Aurore Malet-Karas**

Association "Collectif Féministe Contre le Viol", Paris

**Delphine Bernard-Wallendorf**

Association "Le Regard du Miroir", Reims

**Emmanuelle Piet**

Association "Collectif Féministe Contre le Viol", Paris

**Eric Bertin (✉ [ebertin@chu-reims.fr](mailto:ebertin@chu-reims.fr))**

Clinical Nutrition Transversal Unit of Reims University Hospital and Performance, Health, Metrology, Society Laboratory (PSMS - EA7507) of Reims Champagne-Ardenne University <https://orcid.org/0000-0002-8357-985X>

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## Research Article

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# Abstract

Purpose This study aims at clarifying the links between sexual violence and eating disorders (EDs). Methods In a sample of 12638 victims of sexual violence, we analyzed the situation of 546 victims that declared having developed ED. We assessed the characteristics of the assault (age, type of aggression) and the medical consequences (PTSD, depression, suicide attempts, anxiety disorders ...). Results ED prevalence was 4.3% in the victim sample. The age of the first assault in ED victims was significantly lower than that of the whole population (12y vs 16 y for median; p<0.001). A much higher prevalence of sexual assault consequences was present in victims developing ED 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 ED and sexual violence, especially in childhood, leading to severe psychological consequences. In this context, ED should be envisaged as a coping strategy accompanying emotional dysregulation due to traumatic events, and be treated as such.

## 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 ( $\geq 1/\text{week}$  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...) 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, at the exception of a combination of nutrition therapy and psychotherapy (more particularly familial psychotherapy in AN) [7]. Many individual and socio-cultural factors have been hypothesized in EDs physiopathology. Genetic factors were reported to be involved in AN, contributing to perfectionism, thin-ideal internalization, resistance to hunger and/or body distortion [8]. A few studies have shown that an altered signaling between gut microbiota and host immune and neuroendocrine systems could also be implied in AN and BN [9]. Environmental factors promoting a poor self-esteem, a high level of anxiety and/or mood disorders appear to be particularly significant in EDs [10–13].

Recent studies reported that adverse life events can lead to the repression of negative emotions through emotional overeating or restrained eating [14]. 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 to EDs [15]. Traumatic events, such as physical neglect in childhood [16], bullying in adolescents [16] and violence in adults [17] 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 [18]. 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” [19]. 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 [20] (for a review see Kilimnik et Nelson[21]).

Sexual assault has been identified as a potent risk factor for sexual dysfunction [22], increased likelihood to develop chronic physical and mental disorders, including substance abuse, suicide [23], post-traumatic stress disorder (PTSD) and depression [24] (for a review see [25]). Nonetheless, the scope of the impact of sexual violences remains underdocumented, especially in the case of assault on children, and their consequences on the victims’ health is 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, 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) [26]. Recent sexual assault 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 [27]. One of the first studies on the impact of sexual assault mentionned that the victims reported stomach pain mainly due to the fear they faced [28].

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 [29, 30], 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 [31]. 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 [32].

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 [33].

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 [34]. In outpatients consulting for an ED, the prevalence rate of PTSD varied between 10% and 34% [35, 36], and those who experienced sexual trauma had significantly higher levels of PTSD symptoms than the others [37].

This association between EDs and trauma or PTSD has compelling consequences in therapy, since the patients with both PTSD and ED are significantly more likely to drop out of treatment and relapse [38, 39]. The impact of traumatic experiences would negatively predict remission of ED after cognitive behavioural therapy [40, 41]. 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 [42], that 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 repressed or erased from the memory by a dissociation mechanism [43–46] ; it can also remain unaccessible consciously because it took place too early in childhood to be retrieved as an autobiographical episode [47].

A better characterization of sexual abuse related EDs is needed to help clinicians better identify traumatism in their patients, as to our knowledge, no study has specifically investigated on a large scale the prevalence and characterisation of EDs within a population of sexual victims.

The aim of this study is to further the understanding of the links between EDs and sexual violence. We studied a large population of victims of sexual violence and compared the characteristics of the victims that developed EDs to those of the victims that did not. We focused on psychological consequences related to PTSD, and hypothesized that the victims that developed EDs presented more severe signs of trauma and more severe ED symptoms.

## 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. An anonymous file is created with the spontaneous declaration of the caller.

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, anorexia/bulimia as a reference to any type of EDs, self-medication, drugs, self-mutilation, impacts on relationships, impact on sexuality, impacts on studies or professional life, 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, other mistreatments), 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.

## EDs identification and characterization

To get the files of the victims who developed an ED, 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 EDs (i.e. "eating disorder", "gain" or "loss of weight", "eating too much", "binge eating", "rejection of food/refusing food", "digestive troubles", "difficulties with eating").

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

The EDs were divided into 4 categories in reference to the DSM 5 [4]:

- *Restrictive Anorexia (RA)*: this 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 ED (UED)*: any other mention of ED 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 an ED 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. In order 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 ED 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”, “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” [48];

*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" [49]); 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...). The categories of age at the first assault were: childhood (from 0 to 14 years old included), adolescence (15 to 17 y.o.) and adulthood (from 18 y.o.).

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

## **Link with the perpetrator**

For all victims (with and without ED), 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 12638 victims of sexual assaults (94.6% of women) were analyzed for this study. Their age at the first assault was  $18.6 \pm 12.2$  years (extreme values: 0–87, median = 16 y, unknown value: 10%).

An ED 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 EDs was significantly lower ( $13.3 \pm 10.0$  years; extreme values: 0–64, median = 12 y, unknown value in 12 files) than that of the whole population ( $p < 0.001$ ).

Table 1

Differences between the victims with ED and without ED 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		ED		OR	p
	N	%	N	%		
<b>Age category</b>	4620	36.5	324	60.0	2.22 [1.86–2.65]	< 0.001
Childhood	1475	11.6	70	13.0	1.04 [0.80–1.33]	0.79
Adolescence	5299	41.9	138	25.6	0.42 [0.35–0.51]	< 0.001
Adulthood						
<b>Perpetrator</b>	3216	25.4	174	32.2	1.34 [1.11–1.61]	0.002
Intra-family	6229	49.2	210	38.8	0.62 [0.52–0.73]	< 0.001
Extra-family	2228	17.6	95	17.6	0.96 [0.77–1.20]	0.72
Spouse/partner						
<b>Aggression type</b>	793	6.3	89	16.4	2.99 [2.34–3.83]	< 0.001
Childhood abuse	2069	16.4	151	27.9	1.98 [1.63–2.41]	< 0.001
Sexual aggression	6156	48.7	235	43.4	0.81 [0.68–0.96]	0.02
Rape	ND	ND	79	16.6	ND	< 0.001
Forced oral sex	ND	ND	40	7.4	ND	< 0.001
Forced anal sex	818	6.5	79	14.6	2.48 [1.93–3.18]	
Group assault	2611	20.6	194	35.4	2.05 [1.71–2.46]	
Additional (burns...)						

**ED = victims with Eating Disorder, ND = Not Determined, OR = Odd Ratio [95% Confidence interval]**

The victims that developed an ED 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 EDs is presented in Table 2. RA was the most frequently reported ED (41% of ED 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 and AB were significantly more assaulted during childhood compared to those with RA ( $p = 0.003$ ).

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

Table 2  
Characteristics of victims according to their eating disorder category

	RA (n = 224)	AB (n = 73)	HBE (n = 111)	UED (n = 130)
% of victims with ED	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	51.3%	67.1%	69.4%	63.8%
Childhood	13.4%	9.6%	12.6%	14.6%
Adolescence	33.9%	21.9%	16.2%	20.8%
Adulthood				
Perpetrator	29.9%	37.0%	36.9%	30.0%
Intra-family	41.5%	35.6%	41.4%	33.8%
Extra-family	20.5%	12.3%	12.6%	20.0%
Spouse/partner				
Aggression type	14.7%	20.6%	14.4%	14.6%
Childhood abuse	30.4%	38.4%	27.9%	18.5% **
Sexual aggression	45.5%	41.1%	49.6%	36.2%
Rape	13.8%	19.2%	12.6%	23.9%
Forced oral sex	6.3%	6.9%	7.2%	10.0%
Forced anal sex	15.6%	13.7%	11.7%	16.2%
Group assault	43.7%	43.8%	30.6%	35.4%
Additional (burns...)				

RA = Restrictive Anorexia, AB = Anorexia-Bulimia, HBE = Hyperphagia/Binge Eating, UED = Unspecified Eating Disorders. \*\*  $p = 0.016$

## Consequences of sexual assault(s)

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

Table 3  
Different health consequences for victims that developed ED

	All victims		ED		OR	p
	N	%	N	%		
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

**ED = victims with Eating Disorder, PTSD = Post-Traumatic Stress Disorder, OR = Odd Ratio [95% CI]**

No significant differences were found regarding the prevalence of the different consequences between the 4 ED profiles (Table 4), but some tendencies appeared for anxiety being potentially more declared in UED (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).

Table 4  
Different health consequences between the 4 different Eating Disorders profiles

	RA		AB		HBE		UED		p
	N	%	N	%	N	%	N	%	
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, UED = Unspecified Eating Disorders, PTSD = Post-Traumatic Stress Disorder.*

## Discussion

The present study aims to further explore the links between EDs and sexual violence, via the characterization of the consequences of an assault on the physical and mental health of victims with an ED 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) [50], and is the only study conducted in a large population of sexual victims.

ED 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 an exact classification of EDs in accordance with the DSM5 [4], which could contribute to the absence of any significant differences between the different ED subgroups for some of the variables studied.

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 [37]. They can appear as common clinical symptoms (secondary enuresis, overactive bladder, dysuria, urinary retention...) or sometimes as neurogenic bladder [51].

Among the four types of EDs, RA was more frequently declared (41%). This is concordant with a previous study performed on hospitalized EDs patients in which a PTSD was found to be present in 33.9% [36]. Thus, we answer here to an ongoing debate: a traumatic life history may be observed in RA and is not specific to patients with purging behaviors as previously reported respectively in female teenagers and

adults with anorexia nervosa [33, 52], and in a meta-analysis assessing the association of distinct types of child abuse and different eating disorders, where only BN and BED were significantly associated to sexual abuse [53].

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. 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 [52]. In that study, as in the present one, PTSD prevalence did not differ between RA and AB subgroups. Otherwise, Vidana et al. [30] 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 [54, 55]. Alterations in autobiographical memory especially for negative events have also been reported in AN [56, 57].

As previously hypothesized by Karr et al. [58] to explain the presence of ED after a sexual abuse: some victims of sexual trauma adopt active food restriction to be thinner to minimize secondary sex characteristics and appear less attractive to potential perpetrators; others use bingeing or purging as a means of dissociation to "escape from" PTSD symptoms.

EDs 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 [26, 59]. 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 binging is a response of the urge to fill up in order to forget, a filling that can be put back (BN) to ward off the pain [60]. Interventions focused on improving emotional functioning seem to be especially beneficial for ED patients with trauma histories [61–63].

EDs co-occur frequently with PTSD, especially in BN [64]. High levels of PTSD have been reported in subjects with EDs, and EDs are more present in subjects with PTSD [35, 65]. Moreover, as several studies reported more severe EDs whatever their type in the presence of PTSD [66–68], our data tend to confirm those of Holzer et al [69] and of Dubosc et al [70], 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 litterature [23, 25, 71], and seems to persist regardless of the victim's gender or age at which abuse occurred [50]. Suicide attempts were present in 19.3% of ED 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 [72]. Contrary to some other studies showing a positive association between purging and suicidality [73, 74], 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 ED, especially when a PTSD is present. However, considering the high prevalence of depression in ED subjects victim of sexual violence (45% in our study), this assessment should be performed even in the absence of PTSD.

Apart 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 [75]. The observed lifetime prevalence of NSSI is 20.9% in women and is not associated with an ED type and EDs associated to NSSI are more severe and general psychopathological symptoms are more frequent [76]. In our sample, the association between NSSI and ED was quite strong with an OR of 11.50 [8.29–15.95], and it did not differ between the ED subgroups, thus confirming the previous data on the matter. Emotion dysregulation has been proposed as a causal factor of NSSI [77], 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) [78]. It is well known that these PTSD induced neurological modifications are even more long lasting when the trauma occurs in infancy or childhood [78].

A higher prevalence of alcoholism in the ED subjects is also concordant with previous data showing that ED and substance use disorders commonly co-occur [79]. 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 [80–84]. 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 [85]. 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 [86, 87].

An emerging concept integrates EDs into the field of addictions [88–90], these behaviours representing maladaptive coping strategies, which may offer a distraction from aversive emotional arousal [91]. This could thus explain the recent discovery of a shared genetic risk between eating disorder- and substance-use-related phenotypes [92]. Recent findings in animal literature outline similar neurological signatures between overeating/ BED and substance addiction [93].

No differences were found between ED subtypes, whereas a discrepancy between ED subtypes is reported in human litterature, with BED being more associated with alcoholism and substance abuse than RA [17]. 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 ED within a cohort of victims of sexual violence and to analyze the consequences of sexual assaults by taking into account the presence of an ED.

The main limits of the present study are due to the declarative nature of the data, that did not allow a precise assessment of the number and type of EDs.

## **Conclusion**

Beyond the consequences of sexual assault on mental health, in coherence with the literature [25, 94], this study confirms the strong link between EDs and sexual violence in childhood, leading to trauma responses with high risk of anxiety disorders, depression, suicide attempts, and substance use. The victims that develop ED also present more frequently a PTSD. We thus suggest that, in the context of sexual violences, ED 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 ED is associated to 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 EDs in a large sample of sexual victims would contribute to a better identification of subjects developing an ED as consequence of assault(s) and thus to a more adapted treatment.

## **What This Study Adds?**

Victims of sexual violence developing an ED have more frequently been assaulted in childhood and present more severe psychological consequences.

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

## **Declarations**

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**Conflict of Interest:** The authors report none conflict of interest.

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

**Code availability:** N/A

**Authors contributions statement:**

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, EB; Analysis: AM-K; Writing the manuscript and critical comments to the drafts: AM-K, EB. All authors read and approved the final manuscript.

**Ethics 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 anonymous, no approval by a specific ethical committee was required.

**Consent to participate :** N/A (calls of victims are spontaneous and free, and no additional collect of data was needed for this study)

**Consent for publication :** N/A

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## Figures

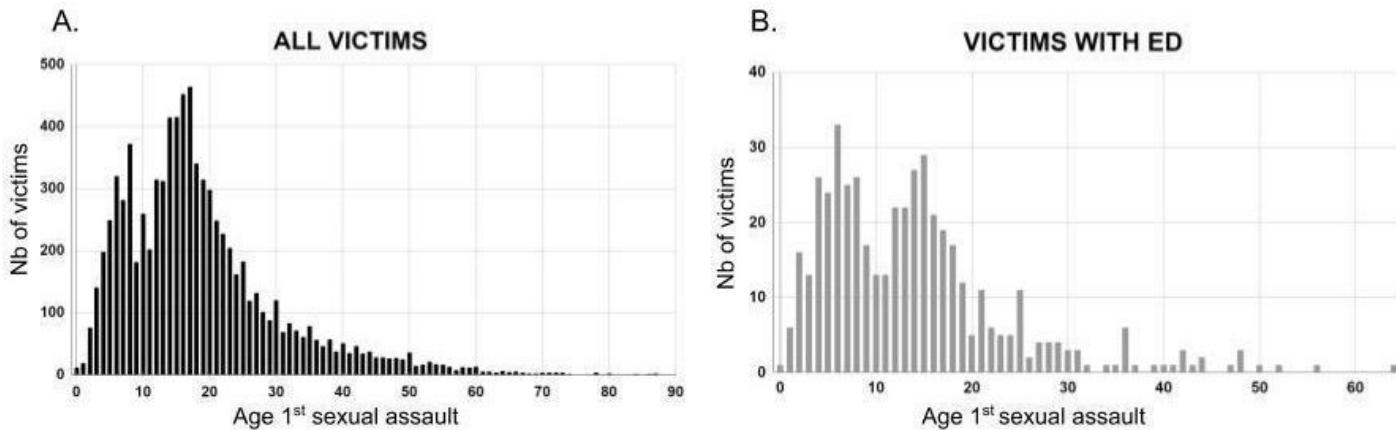


Figure 1

Distribution in the age of victims at the first sexual assault Part A. all the victims (n=12638); Part B. victims that developed an Eating Disorder (ED) (n=546)