

Switching to the bingeing/purging subtype of anorexia nervosa is frequently associated with suicidal attempts[☆]

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Abstract

Objective. — Anorexia nervosa has the highest suicide mortality ratio of psychiatric disorders, suicide being associated with many factors. We assessed the first lifetime occurrence of these factors taking into account their possible overlap.

Method. — Three hundred and four in- and out-patients with anorexia nervosa (DSM-IV) were systematically recruited in three hospitals of Paris suburbs, between December 1999 and January 2003. Patients were assessed by a face-to-face interview (DIGS). Current eating disorder dimensions were measured, and patients interviewed by a trained clinician to assess minimal BMI and, retrospectively, the age at which anorexia nervosa, major depressive disorder, anxiety disorders and switch to bingeing/purging type occurred for the first time, if applicable.

Results. — Major depressive disorder ($p < 0.001$) and subtype switch from the restrictive to the bingeing/purging type ($p < 0.001$) were the two factors significantly more frequently occurring before suicidal attempts, and remained involved when a multivariate analysis is performed, whether syndromic or dimensional measures are being used. Taking into account lifetime occurrence with a survival analysis, the switch to bingeing/purging type of anorexia appears as a major predictive factor, with a large increase of the frequency of suicidal attempts (OR = 15) when compared to patients with neither major depressive disorder nor bingeing/purging type.

Conclusions. — Bingeing/purging type of anorexia nervosa is largely associated with suicidal attempts, and may deserve specific attention. If confirmed on a prospectively designed study, these results would argue for early detection and/or more intensive and specific therapeutic intervention on this aspect of bingeing and purging behaviors.

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1. Introduction

A large meta-analysis of the mortality rate of mental disorders, focusing on studies with at least 2 years follow-up and less than 10% loss of subjects [19], showed that eating disorders have one of the highest standardised mortality ratios (SMR). The suicide risk was 23 times higher in this population than expected [19]. Another analysis of suicide rate in anorexia nervosa indeed found that all studies, except one,

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reported that these patients committed suicide more often than their counterparts in the general population [31,33]. Accordingly, the text of “Practice guidelines for the assessment and treatment of patients with suicidal behaviors” [1], concluded that the mental disorder with the highest standardised mortality ratios (23.1) is anorexia nervosa. After somatic complications [21], suicide is in fact the most common cause of death in this disorder [4,9,30,41].

The importance of detecting early factors associated with suicidal behavior is thus a high priority for clinicians when treating patients with anorexia nervosa. Apart from unspecific socio-demographic parameters (being unemployed and/or unmarried), many factors have already been proposed, including presence or severity of major depressive disorder [13,20,24,30], alcohol and substance abuse [20,45,12,13], specific personality traits or disorders such as being obsessive [12], or borderline personality disorder [38] and severity of anorexia including the lifetime minimal body mass index [12], age [12] and duration of the disorder [12,20]. Some of these factors may be shared by patients with bulimia nervosa, as purging subjects appear to report greater preoccupation with suicide and more suicide attempts than non-purging bulimics [11,45,50].

The bingeing/purging type of anorexia nervosa was also considered as a factor associated with an increased frequency of suicidal attempts in some studies [12,25,26,40,50]. In these studies, the subtype of anorexia was raised as one of the numerous factors involved, the results being based on samples of relatively moderate size (between 37 and 167 patients with anorexia nervosa). Furthermore, none of these analyses took into account the fact that some of the patients studied did not have the same specific subtype during the whole length of the disorder. Only one prospective study gave further indirect support for the role of the bingeing/purging type, as in the seven cases of deaths from a follow-up of nearly 250 patients with eating disorder, all were suffering from anorexia nervosa with the bingeing/purging type [20], although only three cases of these deaths were explicit suicides.

(1) Rarity of anorexia nervosa (in the general population), (2) relatively moderate frequency of suicidal attempts, and (3) presence of different subgroups all support the use of a large sample-size to detect the role of associated factors. Subtypes are unstable across lifetime, and the retrospective approach may more largely detect the switch from one subtype to the other, because of greater statistical power. This technique is nevertheless clearly associated with a set of limitations that need to be carefully controlled, or at least taken into account.

We therefore analyzed the impact of different factors, previously associated in the literature, in the retrospectively assessed occurrence of suicidal attempts in a sample of 304 in- and out-patients with anorexia nervosa only, placing emphasis on the potential interaction between these variables, and taking into account their lifetime occurrence. We also re-analyzed the role of switching to the bingeing/purging subtype in the risk of suicidal attempts in anorexia nervosa, in a meta-analysis of already published studies on this topic.

Our hypothesis was that the occurrence of major depressive episode and the switch to purging/bingeing subtype were both

associated with an increased frequency of suicidal attempts, even when taking into account their potential overlap.

2. Method

An institutional review board approval was obtained for this investigation (*Comité de Protection des Personnes*, Pitié-salpêtrière). After giving informed consent for adults (or informed consent from the parents for children), 304 French patients with anorexia nervosa according to DSM-IV were included (10 men, 2.29%), from November 1999 to January 2003. Inclusion criterion was a lifetime diagnosis of anorexia nervosa (DSM-IV). Exclusion criteria were presence of a psychotic disorder or learning disability (i.e. IQ below 70).

Patients were recruited through present or past hospitalization in three centers in Paris, France, namely the Children Psychiatric Department of Robert Debré Hospital ($N = 97$), the CMME in Sainte-Anne Hospital ($N = 195$), and the Psychiatric Department in Louis Mourier Hospital ($N = 12$). All patients were interviewed by clinicians (A.K., L.R., K.H., S.M.) using the diagnostic interview for genetic studies (DIGS), a semi-structured instrument which assesses all ages at onset and criteria of lifetime psychiatric diagnoses according to DSM-IV. The validated French version [34] (Preisig et al., 1999) of this interview was used, clinicians following training as proposed in the guidelines [27].

Specific attention was given, on the basis of these face-to-face interviews using the DIGS and to the patients' files at each hospital, to the age at which different disorders occurred, namely first suicidal attempt, first major depressive disorder, first anxious disorders, and first addictive disorders. These occurrences were then compared to the age of onset of anorexia nervosa for each patients, distinguishing the two subtypes, i.e. the age at which the criteria of the restrictive and/or the bingeing/purging subtype were first met. All diagnostics and chronology of occurrence detected by the DIGS were further checked by two senior clinicians (C.F., P.G.). In one case out of 10, diagnoses (mainly major depressive episodes) or core clinical criteria (such as age at onset of suicidal attempts and of anorexia nervosa subtype and minimal BMI) initially derived from the DIGS were modified because of the information collected in the hospital files (usually associated with another interview of the patient).

The average age at interview was 22.3 years old. Presence or absence of suicide attempts, level of intention (1–3) and lethality (1–6) were assessed with the DIGS.

Several self-rated questionnaires were also used such as the Eating Disorder Inventory, EDI [17], the 26-items Eating Attitudes Test, EAT [16] and the 13-items Beck Depression Inventory, BDI [3].

As many factors were analyzed, the risk of false-positive results increases. We therefore used the Bonferroni correction (indicated in the text for each case), dividing the observed p -value (in tables) by the number of tested parameters. Odds ratio and their 95% confidence interval are given when appropriate.

Statistical analyses were performed using SPSS computer programme (SPSS Inc., Chicago, IL, USA). Considering the

number of variables and their potential overlap, a logistic regression analysis was used to reveal parameters that may be important in distinguishing patients with versus without suicidal attempt. Default p -values for stepwise entry ($p = 0.10$), and removal ($p = 0.15$) of predictors into the logistic model were retained [22]. The analysis was made for categorical (i.e. diagnosis or behavior), and then for dimensional variables (for example age or severity), in order to avoid overlap, and adding systematically the age at interview (to partly control the role of differential mean time of exposure).

In order to check if bingeing/purging subtype is really associated with an increased frequency of suicidal attempts in patients, as in the current study, we performed a meta-analysis. The word “anorexia nervosa” associated with “suicid*” (for suicide or suicidal) and/or “subtype” generated 262 articles published between 1966 and 2005 in PubMed®. We found only five articles which were (1) original works, (2) measuring suicidal frequency in patients with anorexia nervosa, assessing and (3) the subtype of anorexia nervosa [11,25,26,40,50].

The Woolf method [49] allows the calculation of total χ^2 (representing the sum of the different χ^2), gives a χ^2 estimating the between samples heterogeneity, and evaluates the specific χ^2 (i.e. the χ^2 considering all association studies, but excluding the part due to heterogeneity).

Survival curves were finally constructed, using the Kaplan–Meier method [23]. The purpose was to take into account the fact that the mean time of exposure might be variable across samples, and to allow all patients to contribute to the analysis for the entire length of time she/he was exposed. The mean time of exposure is defined as the time between occurrence of the studied trait (major depressive disorder or switching to purging type, for example) and the age at interview (the event is then “censored” for the rest of the time) or the suicidal attempt (the event is then considered as “present”).

3. Results

Lifetime history of suicidal attempts was detected in 86 patients out of 304 (28.3%), all of them being women, the majority having more than one episode of suicidal attempt (55.8%).

The average age at onset of the first suicidal attempt was 21.5 (s.d. = 6.83), and 91.9% of the suicidal attempts ($N = 79$) occurred after the onset of anorexia nervosa. The level of intention was medium or serious for the majority of patients (36% in each case), and more rarely minimal (26.8%). The severity (lethality) of the suicide attempt was essentially medium (32.6%) or moderate (20.9%), and in some cases absent (10.5%) or minimal (13.9%), but sometimes extreme (11.6%). The average time of exposure on which was based the assessments (between the onset of anorexia nervosa and the age at interview) was 6.23 years (s.d. = 6.48), with a minimum of 6 months and a maximum of 35 years.

3.1. Subtype of anorexia nervosa

Presence of bingeing/purging behavior at the time of interview was the most important factor distinguishing patients with, versus without, past suicidal attempt. This was true whether analyzed at the categorical level, i.e. presence of the bingeing/purging subtype (OR = 9.05; 95%CI[4.79–17.08]; $p < 0.001$, Bonferonni corrected) (Table 1), or at the dimensional level, for one of the EDI dimensions ($p < 0.001$, Bonferonni corrected) (“bulimia”) as well as for the EAT related dimension ($p < 0.001$, Bonferonni corrected) (Table 2). In the whole sample, suicidal attempts occurred later in patients with (average = 21.92 years, s.d. = 6.71) versus without (average = 19.14 years, s.d. = 7.20) the bingeing/purging subtype at time of interview ($t = 3.48$, $df = 302$, $p < 0.001$). For patients with at least one suicidal attempt, patients with bingeing/purging subtype had an increased average number of suicidal attempts (1.99, s.d. = 1.22; $t = 1.75$, $df = 302$, $p = 0.041$) and a tendency for increased lethality (3.53, s.d. = 1.43; $t = 1.37$, $df = 302$, $p = 0.086$) than the rest of the sample.

3.2. Major depressive episode

Depression was also highly associated with suicidal behavior, once again whether lifetime co-morbidity is considered (OR = 3.10; 95%CI[1.64–5.85]; $p = 0.004$, Bonferonni

Table 1

Major clinical characteristics of patients with anorexia nervosa, with or without a lifetime history of suicidal attempt

Clinical characteristics	Patients with anorexia nervosa				Comparison	Significance
	With suicidal attempt ($N = 86$)		Without suicidal attempt ($N = 218$)			
	N or Average	% or s.d.	N or Average	% or sd		
Anorexia nervosa age at onset (years)		16.9		0.052		
Bingeing/purging type	72	83.7%	79	36.2%	0.039	1.76
Minimal body mass index (kg/m^{-2})		14.4		0.022		55.6
Major depressive disorder	72	83.7%	136	62.4%	0.021	3.84
Age at onset of first depressive episode		20.4		0.067		12.9
Obsessive compulsive disorder	16	18.6%	26	11.9%	0.062	3.40
Agoraphobia	1	1.2%	6	2.8%		0.13
Social phobia	3	3.5%	15	6.9%		0.7
Panic disorder	5	5.8%	16	7.3%		1.3
Alcohol dependence	2	2.3%	5	2.3%		0.2
Cannabis dependence	4	4.6%	4	1.8%		16
						0.98
						0.17

Table 2
Clinical dimensions in patients with anorexia nervosa, with and without a lifetime history of suicidal attempt

Instruments	Clinical dimensions	Patients with anorexia nervosa				Comparison	Significance		
		With suicidal attempt (N = 86)		Without suicidal attempt (N = 218)			t	df	p-Value
		Mean	s.d.	Mean	s.d.				
EDI	Drive for thinness	12.2	7.0	9.3	7.0	3.25	288	0.001	
	Bulimia	7.4	6.8	2.8	5.0	5.69	288	<0.0001	
	Body dissatisfaction	16	8.2	12.9	7.8	3.00	288	0.0028	
	Ineffectiveness	11.2	7.2	8.4	6.5	3.13	288	0.0018	
	Perfectionism	6.8	4.3	6.1	4.1	1.29	288	0.196	
	Interpersonal distrust	5.9	3.9	5.6	3.9	0.60	288	0.540	
	Interoceptive awareness	11.7	7.4	8.5	6.9	3.40	288	0.0006	
	Maturity fears	6.5	6.2	5.9	5.3	0.70	288	0.420	
	Asceticism	8.8	4.9	7.1	4.0	2.80	227	0.0044	
	Impulse regulation	6.8	6.5	4.2	4.6	3.38	227	0.0008	
	Social insecurity	8.9	5.0	7.1	4.2	2.95	227	0.0033	
EAT	Avoidance-preoccupation	19.5	10.6	15.3	10.4	3.12	283	0.0019	
	Bulimia	10.3	6.0	6.6	5.6	4.90	283	<0.0001	
	Oral control	6.8	5.2	7.6	5.3	1.20	283	0.230	
	EAT-26 total	36.6	18.5	29.4	18.1	3.00	283	0.004	
Beck	BECK total score	15.7	7.8	11.4	6.3	4.30	288	<0.0001	

corrected) or the level of depression on the basis of the Beck rating ($p \leq 0.001$, Bonferroni corrected) at the time of interview (Table 2). Age at onset of major depressive disorder was the third significantly involved parameter ($p = 0.008$, Bonferroni corrected) (Table 1), with a later age at onset for patients with suicidal attempts.

3.3. Assessing all associated variables in a regression analysis

Bingeing/purging behavior and depression at the time of the interview were important factors, but other parameters also distinguish patients with versus without suicidal attempts, although to a lesser extent (Tables 1 and 2). A stepwise logistic regression analysis was therefore performed. At the syndromic level, bingeing/purging subtype (Wald $\chi^2 = 47.7$, $df = 1$, $p < 0.001$) and then major depressive disorder (Wald $\chi^2 = 14.4$, $df = 1$; $p = 0.001$), both at the time of the interview, were the only variables retained in the final model, giving the opportunity to correctly classify 77% of all cases. At the dimensional level, bulimia dimension of the EDI (Wald $\chi^2 = 13.6$, $df = 1$, $p < 0.001$), then total Beck depressive score (Wald $\chi^2 = 7.6$, $df = 1$, $p = 0.006$) and the third dimension of the EAT (bulimia) (Wald $\chi^2 = 4.1$, $df = 1$, $p = 0.040$) were the three variables retained, correctly classifying 72% of cases.

3.4. Taking into account potential overlap in mean time of exposure

Conclusions for the role of purging/bingeing, in bulimic dimensions or in characterizing subtypes, are difficult to reach, as they can be contaminated by other key factors, such as major depressive disorder. The third step of our analyses was thus devoted to the specific role of major depressive disorder, and bingeing/purging subtype, taking into account the presence

of these two traits for each patient. Excluding the seven cases with suicidal attempts before the onset of anorexia nervosa, the analyses are based on 297 patients. For patients without major depressive disorder nor bingeing/purging subtype, 3.31% of suicidal attempts are observed (as eight suicidal attempts were detected in 242 patients during the period of anorexia nervosa with no major depressive disorder nor bingeing/purging subtype). When major depressive disorder is detected at least once, the frequency (57 suicidal attempts in 210 patients) is increased (OR = 10.90; 95%CI[5.06–23.48]). For subjects with anorexia nervosa and at least one period of bingeing/purging type, this frequency is further increased, with 59 suicidal attempts in 175 patients (OR = 14.88; 95%CI[6.88–32.17]). Finally, when both major depressive disorder and bingeing/purging type are present, the frequency is 50% for the 76 concerned patients (OR = 29.25; 95%CI[12.68–67.48]). The increasing frequency of suicidal attempts in these three groups (OR = 10.90, 14.88 and 29.25) were not largely modified when the 12 very young patients (below 13 years old) are excluded in order to focus the analyses on potentially more reliable and at-risk patients (OR = 11.02, 14.56, 32.96).

In order to further highlight the respective roles of major depressive disorder and the switch to a bingeing/purging subtype in suicidal attempts according to time, survival curves are described in Fig. 1, favouring a more important role of bingeing/purging type occurrence versus first major depressive disorder onset to explain suicidal attempts (see Fig. 1).

3.5. Re-assessing the role of bingeing/purging subtype on suicidal risk in a meta-analysis

We finally compared the odds ratio of bingeing/purging type observed in our study (OR = 9.70) with the ones observed in the five other studies analyzing the role of bingeing/purging

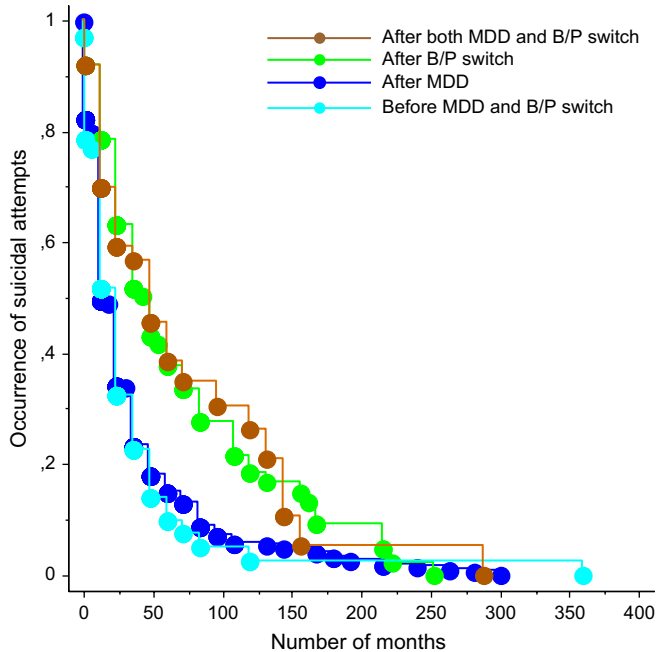


Fig. 1. Survival curve comparing the retrospective role of (1) major depressive disorder and (2) the switch to bingeing/purging type in the occurrence of suicidal attempts, in 298 patients with anorexia nervosa. Cumulative frequencies of suicidal attempts are described in 298 patients with anorexia nervosa, distinguishing four periods of time (with or without major depressive disorder, and with or without purging/bingeing subtype), and assessing a maximal period of 30 years (360 months). The total frequency of suicidal attempts was only slightly increased in the period of time the patients had co-morbid major depressive disorder (dark blue) compared to the patients with no co-morbidity (light blue). During the period of time when patients had purging/bingeing subtype, this frequency is clearly increased (green), and even a bit more for the period of time patients had both purging/bingeing subtype and co-morbid major depressive disorder.

type-anorexia nervosa on the presence of suicidal attempts. The meta-analysis of these five samples and the present one gives no inter-study heterogeneity ($\chi^2 = 4.46$, $df = 5$, $p = 0.19$) and a very large specific association between bingeing/purging type and suicidal attempts ($\chi^2 = 68.93$, $df = 1$, $p < 0.001$) (Fig. 2), with a final odds ratio of 5.42 (95%CI: 3.62–8.12).

4. Discussion

In this retrospective study on 304 patients with anorexia nervosa, we found strong and convergent relationships between past suicide attempts and bingeing/purging behaviors, both at the syndromic and dimensional levels. Major depressive disorder was also strongly associated with past suicidal behavior, but having a large overlap with the first associated factor. Interestingly, when applying a survival analysis, occurrence of bingeing/purging type dramatically shortened the delay before suicidal attempt and this was not the case for major depressive disorder. Presence or occurrence of bingeing/purging type of anorexia nervosa was thus the most important marker of suicidal attempts in our sample. Half of our initial hypotheses could therefore be considered as true, namely the

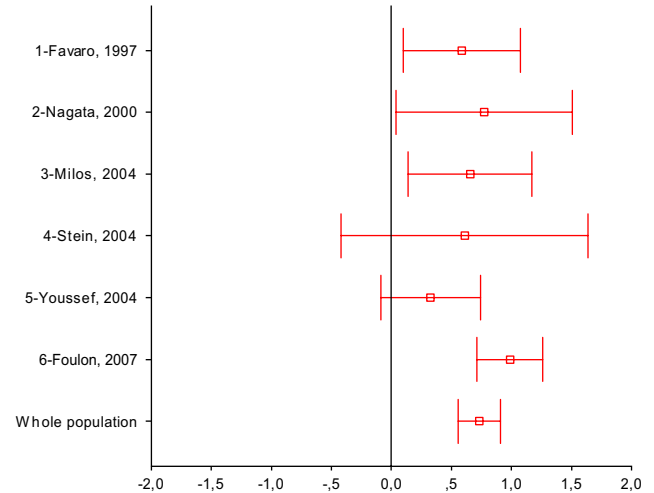


Fig. 2. Logarithm of the odds ratio (OR), and its 95% confidence interval, of six association studies, and in the sum of these studies, between bingeing/purging type and suicidal attempts. The OR equal to one ($\text{Log}[1] = 0$) is represented with a black line. The odds ratio corresponding to the whole sample ($\text{OR} = 5.42$, 95%CI[3.62–8.12]) is computed on the basis of all studies, but having extracted the inter-study heterogeneity (meta-analysis).

one concerning the major role of the bingeing/purging subtype in suicidal attempts. The impact of major depressive episode, on the other hand, remained unclear. Its direct role is high (OR around 11) but probably has a large overlap with the occurrence of a switch to the bingeing/purging subtype (Fig. 1).

Impulsive, self-harming and suicide behaviors have indeed been linked to bulimia nervosa symptoms [5,7,12,14,25]. More precisely, the increased frequency of suicidal attempts in patients with bingeing/purging type-anorexia nervosa has already been shown [12,25,26,40,50]. In these studies, patients with bingeing/purging type always had an increased risk of suicidal attempts than patients with the restrictive type, in accordance with our own results. Indeed, the meta-analysis of these samples (Fig. 2) shows that, in the literature as a whole, bingeing/purging type is associated with an increase rate of suicidal attempts in anorexia nervosa.

The recent prospective longitudinal study of Franko et al. [13] examined the predictors of suicide attempts over 9 years in a group of 136 patients with anorexia nervosa. The authors concluded that bulimia nervosa symptoms (including binge eating and vomiting) measured over the course of the study did not predict suicide attempts in the subjects diagnosed with anorexia nervosa at intake. On the other hand, the severity of depressive symptoms was predictive of suicide attempts, in accordance with other studies [25,45]. Nevertheless Bulik et al. [4], when comparing the rates of suicide attempts in three groups of patients (with anorexia nervosa, bulimia or major depression), pointed out that for anorexia nervosa presence of depression did not appear to be related to the risk of suicide attempt. The strong initial association we found between both bingeing/purging type and major depressive disorder with suicidal attempt (and also the large impact of the time course of each factor) give sense to such discrepancies. Focusing on onsets of disorder with a retrospective approach was indeed

already proved useful, for example showing that the onset of major depression in the suicidal attempts group occurred significantly more often before the onset of the eating disorder [48].

The link between a subtype switch in anorexia nervosa and an increased risk of suicidal behavior is unclear. A linear relationship has been proposed between uneasiness linked to body image and suicide risk [32]. Indeed, bodily dissatisfaction may enhance suffering and intensify self-destructive attitudes [29]. It is therefore possible that purging and bingeing behaviors may worsen body image and self-confidence, therefore worsening suicidal ideas. For example, bingeing could be viewed as a failure to control appetite, and purging as a loss of previous asceticism.

Non-restricting subtype of anorexia nervosa was associated with higher score of one dimension of perfectionism (i.e. parental criticism) and vomiting behavior was related with lower self-directedness [36]. Accordingly, involving in purging or bingeing behaviors could also be considered as a marker of increased morbidity (because of higher dimensions of perfectionism or lower self-directedness).

Another possibility is that switching to bingeing/purging subtype of anorexia is associated with higher co-morbidity, as suggested by Pompili et al. [33], that might more directly increase the risk of suicidal behavior, such as substance abuse, affective disorder or impulse-control disorders [15,35,44]. Nevertheless, according to the present study, substance abuse and mood disorders do not appear as confusing factors, although a more longitudinal approach is required for such conclusion.

Impulsivity has been frequently considered as more characteristic of individuals with bulimic than with restrictive eating disorders [6,7,10,39,46,47]. As higher impulsivity is regularly associated with an increased risk of suicidal attempt in a large variety of psychiatric disorder, including anorexia nervosa [2], impulsivity could represent a candidate to explain the higher risk of patients with the purging/bingeing subtype of anorexia nervosa. The literature on impulsivity in anorexia nervosa is complex as impulsivity is multidimensional. Interestingly, assessing impulsivity through behavioral test (with a Go/No-Go task), and not restricting the analyses to paper-and-pencil measures, Rosval et al. [37] showed that errors of commission under the punishment condition was equal in anorexia nervosa-restrictive type and in controls, but dramatically increased (more than doubled) in anorexia nervosa-bingeing/purging subtype. The latter group is therefore displaying greater response disinhibition, and emits more impulsive behaviors, a pattern of functioning that could be at higher risk for suicidal attempt.

4.1. *Some limitations need to be raised in this study*

Firstly, the most appropriate way to measure occurrence of events in the course of a disorder is a prospective assessment. Patients selected in retrospective analyses are indeed less representative (as, for example, all the patients were asking for care at least once, and all survived their suicidal attempts, if

any), and the quality of assessments may decrease for events occurring decades before the interview. Furthermore, impulsive dimensions may have rich and complex relationships with mood disorders to explain lifetime suicidal risk [8,43], which may be difficult to identify on retrospective assessments. Accordingly, our results should be confirmed by a cohort study. Nevertheless, the retrospective assessments we made in this study were based on face-to-face interview by trained clinicians with validated instruments, were controlled by senior psychiatrists, and were faced to the hospital files that were available for all patients. Furthermore, this approach has different advantages, as it was based on a large sample with a long period of observation (up to 31 years). The reduced specificity of our findings, as they were retrospectively assessed, may thus be compensated by the increase in statistical power. Benefiting from a long period of observation could be particularly important regarding the wide fluctuation of symptoms and subtypes of anorexia nervosa [43].

Secondly, some potentially important factors were not analyzed, such as for example borderline personality disorder [28], and the sample studied was not recruited in order to be representative of all cases of anorexia nervosa. As they were all at least once hospitalized, the sample is biased for more severe cases, high co-morbidity rates (Berkson bias) and probably higher suicide attempt rates (above 25% in our case). Within this view, the sample had statistical advantages for detecting links, even of moderate intensity, between events (as they may be more frequent in this treated population), but the intensity of the relationships detected may be irrelevant when used for a single patient.

Thirdly, in the attempt to recruit a large sample of patients with various types of anorexia nervosa, the age range of participants was very broad (from 8 to 52 years old at assessment). It is thus possible that the youngest patients could develop bingeing/purging behaviors after the interview, specifically as a longer duration of the illness appeared to be linked with an increased risk of suicide attempt [12]. On the other hand, the level of exposure was high enough for all events, and the risk of unequally censoring a specific set of events is weak.

The present study shows the high prevalence of suicide attempts in anorexia nervosa and the importance of detecting subgroups among anorexic patients with high suicide risk. Our data, which need to be prospectively confirmed, suggests that when bingeing and purging symptoms occur in the course of illness, clinicians should be aware of the increased risk of suicidal behavior. Assessing temperament, mood level and impulsivity in patients with anorexia nervosa, restrictive type, would be informative if patients were re-assessed at least 2 years later, in order to see what distinguishes those that have, meanwhile, switched to the purging/bingeing type.

Systematic detection and a probably more intensive therapeutic intervention for this aspect could be proposed. It would indeed be interesting to see if focusing care on the prevention of bulimic/purging behaviors, for example with cognitive behavioral treatment, do reduce long-term suicidal risk. The

impact of providing information to patients and to their families could also be an important aspect to analyze.

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