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Illness perception in patients with eating disorders: clinical, personality, and food addiction correlates

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ABSTRACT

Purpose: Although the role of illness perception in the clinical course of many physical diseases and certain mental disorders has been well described, little is known about illness perception in eating disorders (ED) so far. Therefore, the purpose of this study was to extend our understanding of illness perception in different ED diagnostic types and to explore its association between clinical, psychopathological, motivational, personality, and food addiction (FA) features.

Methods: The sample consisted of 104 patients with ED [(23 anorexia nervosa (AN), 39 bulimia nervosa (BN), 19 binge eating disorder (BED), and 23 other specified feeding and eating disorders (OSFED)]. Illness perception was assessed by means of the revised version of the Illness Perception Questionnaire (IPQ-R).

Results: The results supported the association between illness perception and clinical, psychopathological, and personality factors. Patients with bulimia nervosa and binge eating disorder showed greater illness perception than the other types. Improved illness perception was best explained by a longer duration of the disorder and food addiction. Furthermore, a relevant finding suggests that at least half of the patients with eating disorders did not achieve a good level of illness perception until after having the disorder for 20 years on average.

Conclusion: Our findings suggest that longer duration of the eating disorder and food addiction-related symptoms may act as the best indicators of improved illness perception. This may explain the low levels of initial motivation in these patients and their high dropout rates in the early stages of treatment.

KEYWORDS: eating disorders, food addiction, illness perception, insight, personality

Introduction

Based on the theoretical framework of the Self-Regulation Model (SRM) of illness developed by Leventhal, Meyer, & Nerenz [1], the concept ‘illness perception’ is defined as a dimensional construct that explores the individual’s beliefs and representations regarding their illness. Beyond the mere concept of insight (i.e., illness awareness), this construct includes perceptions about identity, timeline, consequences, control, and cause of illness [2, 3]. Illness perception has been associated with the individual's cognitive and emotional response to the illness as well as with coping, social functioning, and emotional distress [4]. To assess this complex construct based on the SRM, the Illness Perception Questionnaire (IPQ) and its revised version (IPQ-R) are available [5, 6].

Recent research on illness perception has been conducted in physical conditions such as myocardial infarction [7], rheumatoid arthritis [8], asthma [9], diabetes [10], or inflammatory bowel diseases [11], among others. These studies agree that illness perception drives attitudes toward it, highlighting that patients who perceive their disease as manageable are more likely to actively care for their health and, therefore, achieve improved medical, psychosocial, and behavioral outcomes [12].

The perception of illness in mental health has also been examined [13]. Studies conducted on patients with psychosis show that increased illness perception promotes adherence, self-efficacy, and improved clinical outcome for these patients [14]. Studies carried out on other psychiatric disorders, such as bipolar disorder [15], obsessive-compulsive disorder [16], or mood disorders [17], also corroborate the relevance of illness perception in treatment adherence.

Regarding eating disorders (ED), little is known about the role that illness perception plays. The few studies addressing this topic have mainly examined insight. Cognitive rigidity seems to contribute to the lack of insight, and the patients with the restrictive subtype of anorexia nervosa (AN) present poorer insight than those with the binge–purging subtype [18]. In addition, although

most patients with AN do not show changes in insight during treatment, despite clinical and cognitive improvement, increased insight has been associated with improvements in the emotional sphere [19]. However, it is important to note that the literature on this topic is controversial so far. While some studies postulate that lack of insight in patients with AN may be associated with deficits at the metacognitive level [20], others point out that these patients may show a deliberate denial of the disorder rather than a lack of illness awareness [18].

Considering specifically the studies on illness perception, the scarce literature on this topic shows that patients perceive their ED as something chronic, distressing, varying over time, and with negative consequences [13]. Most patients with ED are more concerned about the social and psychological impact of the disorder than the physical consequences [21]. In the same vein, Quiles et al. [22] found that the emotional aspects of illness perception are highly related to emotional adjustment, whereas illness identity and cure dimensions are the most significant dimensions associated with psychosocial adaptation. The same authors further suggested that positive perceptions regarding the control and cure of the ED, by patients and their relatives, were associated with lower levels of comorbid depression and anxiety [23]. In addition, a positive association between illness perception and motivation to recover has been described [21].

However, the literature so far has some limitations. First, some clinical variables that are crucial to understand the perception of the illness have not been sufficiently addressed (i.e., motivation to change, number of previous treatments, or severity of the disorder). Second, most studies have mainly focused on patients with AN and BN but have not sufficiently considered other prevalent ED, such as binge eating disorder (BED), other specified feeding or eating disorders (OSFED), and/or food addiction (FA). Regarding the latter, although it has not been recognized as a diagnostic entity so far, it is postulated as a transdiagnostic construct of increased interest for the understanding of certain ED-related behaviors [24]. In addition, FA has also been associated with ED severity and treatment outcome, mainly in patients with BED [25].

Thus, this study attempts to address the aforementioned gaps in the literature. To the best of our knowledge, this is the first study analyzing illness perception in a sample of different ED diagnostic types, including FA-related symptomatology, and considering the clinical variables related to the course of the disorder. Therefore, the aims of this study were fourfold: 1) to examine the association between illness perception and clinical characteristics (symptomatological, psychopathological, motivational, and personality factors) among patients with ED; 2) to analyze differences in illness perception among the different ED diagnostic types; 3) to assess whether illness perception is associated with FA-related symptomatology; and 4) to identify the most related factors to illness perception.

Methods

Participants

The entire sample consisted of 104 patients with ED [23 AN (16 restricting and 7 binge-purging subtypes), 39 BN, 19 BED, and 23 OSFED]. All patients were diagnosed according to DSM-5 criteria [26] by senior clinicians specialized in ED. Consistent with the expected gender distribution in EDs, over 90% of the sample was female (n=94 females and n=10 males). Patients were consecutively referred for assessment and treatment at the ED Unit of the Department of Psychiatry of the Bellvitge University Hospital (Barcelona, Spain) between January and November 2019.

Assessment

Sociodemographic and clinical variables were obtained by means of a face-to-face, semi-structured interview based on the SCID-5 interview [27] and conducted by experienced clinical psychologists and psychiatrists. Additionally, a comprehensive battery of commonly applied questionnaires in the field of EDs was administered.

Revised-Illness Perception Questionnaire (IPQ-R) [6]; Spanish validation [28]. Based on Leventhal's SRM, this questionnaire was administered to assess patients' beliefs and representations

of their disorder in eight dimensions: identity (i.e., to match symptoms to an illness label), timeline-duration (i.e., whether the illness is perceived as acute or chronic in nature), consequences (i.e., the extent of perceived consequences of the illness), control (i.e., the level of perceived control over the illness), cure (the level of perceived control the treatments have over the illness), timeline-cyclical (i.e., whether the illness is perceived as a stable or unstable pattern), emotional representation (i.e., negative emotion attributed as a cause of the illness), and causes (i.e., perceived causes of the illness). The identity scale was presented first and consisted of 14 commonly experienced symptoms (yes/no response format). In the following section, the subscales timeline, consequences, control, cure, timeline—cyclical, and emotional response were rated on a five-point Likert scale (strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree). Finally, the causal dimension was presented as a separate section, which used the same five-point Likert scale, and was composed of four components: *ED specified causes* (i.e., media influence, low self-esteem, peer pressure, to get attention, traumatic life events, to impress others, need to be perfect, to make fun of the body), *risk factors* (i.e., altered immunity, overwork, hereditary, accident/injury, smoking, and alcohol use), *psychological causes* (i.e., own behavior, emotional state, personality, and mental attitude), and *external causes* (chance or bad luck, poor medical care in past, pollution, and germs or virus).

Eating Disorders Inventory-2 (EDI-2) [29]; Spanish validation [30]. This instrument was used to assess different ED-related psychopathological characteristics: drive for thinness, body dissatisfaction, bulimia, ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, maturity fears, asceticism, impulse regulation, and social insecurity. For the current sample, the internal consistency (coefficient alpha) was excellent ($\alpha = .95$).

Symptom Checklist-90 Items-Revised (SCL-90-R) [31]; Spanish validation [32]. This questionnaire was administered to assess general psychopathology: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. In addition, it assesses three global indices of psychological distress:

Global Severity Index (GSI), Positive Symptom Total (PST), and Positive Symptom Distress Index (PSDI). The internal consistency was excellent in our sample ($\alpha = .97$).

Temperament and Character Inventory–Revised (TCI-R) [33]; Spanish validation [34]. This instrument, based on Cloninger model of personality, assesses the four temperament (harm avoidance, novelty seeking, reward dependence, and persistence) and the three character (self-directedness, cooperativeness, and self-transcendence) dimensions of personality. Cronbach's alpha for the current sample was good ($\alpha = .82$ for "novelty seeking") to excellent ($\alpha = .90$ for "harm avoidance").

Yale Food addiction Scale 2.0 (YFAS 2.0) [35]; Spanish validation [36]. This is a 35-item self-report instrument that was designed to assess food addiction (FA) according to 11 symptoms based on substance dependence listed in the DSM-5 [26] and adapted to the context of food consumption. This scale produces two measurements: (a) a continuous symptom count score that reflects the number of fulfilled diagnostic criteria (ranging from 0 to 11), and (b) a FA threshold based on the number of symptoms (at least 2) and self-reported clinically significant impairment or distress. This final measurement classifies FA as binary (present versus absent). Additionally, based on the revised DSM-5 taxonomy, is possible to establish severity cut-offs: mild (2–3 symptoms), moderate (4–5 symptoms), and severe (6–11 symptoms). The internal consistency of our sample was excellent ($\alpha = .97$).

The *motivational stage of change* was assessed through five visual analogue scales: subjective desire for treatment, need of treatment; impairment, worry [self], and worry [family]. The scales ranged from 0 to 8, with 8 being the maximum score indicating worry and motivation for change. The scale has been previously described and applied in ED patients [37].

Statistical Analyses

Statistical analysis was carried out with Stata16 for windows [38]. The comparison of the IPQ-R scales between the study groups was based on analysis of variance (ANOVA) procedures.

To control increase in Type-I error due multiple statistical comparisons, the Finner method was used (this is a familywise error rate stepwise procedure that offers a more powerful test than the classical Bonferroni correction) [39, 40]. In addition, the effect size of the mean comparisons was estimated with the standardized Cohen's d coefficient (effect size was considered null for $|d| < 0.20$, low-poor $|d| > 0.20$, moderate-medium for $|d| > 0.50$, and large-high for $|d| > 0.80$) [41].

Pearson correlation coefficients (R) estimated the association between the IPQ-R scales with the clinical measures of the study (age, age of onset, duration of the ED, EDI-2 scales, FA severity, SCL-90R scales, personality traits (TCI-R), motivational stage, and number of previous treatments). Due the strong association between the sample size with the correlation significance tests (low correlations tend to show significant results within large samples, while high coefficients tend to show non-significant results within low samples), this study only considered mild-moderate correlations for $|R| > 0.24$ and high-large correlations for $|R| > 0.37$ (these thresholds correspond to Cohen's d values of 0.50 and 0.80, respectively) [42, 43].

Kaplan-Meier (product-limit) estimators described the relationship between the duration of the ED and the probability of a higher IPQ-R total score [defined as a raw score higher than the median (percentile 50) in the study]. This procedure is used to estimate the survival function from "lifetime" data [44]. In this study, this procedure was used to measure the length of time (defined as the duration of the illness) before the patients registered a high IPQ-R total score.

Path analysis modeled the underlying relationships (direct and indirect effects) between the main variables of the study. This procedure constitutes a straightforward extension of multiple regression modeling, and it is used with the aim of estimating the magnitude and significance of hypothesized associations into a set of variables including mediational links [45]. Path analysis in this study was implemented through structural equation modeling (SEM), defining the next variables and roles: a) as predictors the patients' sex and the duration of the ED; b) as outcome the illness perception measures; and c) and as potential mediators the FA severity level (YFAS-2 total score), the self-directedness level, the global psychopathological distress (SCL-90R GSI) and the

ED severity (EDI-2 total). Based on the multiple variables measuring the illness perception in the study, a latent variable defined by the IPQ-R scales was defined as the outcome (use of latent variables in SEM allows simplify the data structure and therefore facilitates a more parsimonious fitting). All participants of the study were considered for the modeling and the maximum-likelihood estimation was employed (boxplot and histogram were used to test how data met the assumption of normality). Adequate goodness-of-fit was tested with the root-mean-square error of approximation (RMSEA<0.08), Bentler's Comparative Fit Index (CFI>0.90), the Tucker–Lewis Index (TLI>0.90), and the standardized root-mean-square residual (SRMR<0.10) [46].

Results

Characteristics of the sample

Most participants were single [n=78 (75.0%), versus n=16 (15.4%) married and n=10 divorced (9.6%)], had a secondary education level [n=47 (45.2%), versus n=38 with primary (36.5%) and n=19 with university (18.3%)], were unemployed (n=62, 59.6%), and perceived themselves with average to low social position levels (n=86, 82.8%). Mean age was 30.9 years (SD=12.8), mean age of ED onset was 18.7 years (SD=7.7), and the mean duration of eating problems was 12.1 years (SD=11.3).

Table 1 shows the distribution of the sociodemographic features, BMI, age, onset and duration of the disorder within each diagnostic subtype. As expected, differences between the groups were found for the BMI. Differences also emerged for the patients' age (youngest mean age among AN, and oldest mean age among BED) and the duration of the disorder (shortest mean duration for OSFED and longest for BED).

--- Insert Table 1 ---

Association between clinical profile and illness perception scores

Table 2 displays the correlation matrix between the clinical measures of the study with the scores registered in the IPQ-R questionnaire. The IPQ-R 'duration scale' was the illness perception

dimension with most significant associations (i.e., positively correlated with ED severity (measured by means of EDI-2 total score), FA, psychopathological state, harm avoidance, self-directedness, the perceived intensity and impairment related to the ED, and the number of previous treatments), followed by the consequences and emotional scales (which also achieved relevant positive associations with the ED severity level, FA, psychopathological state, and motivational scales). The IPQ-R scales with the lower number of relevant associations to the clinical state were causes—psychological (related to EDI-2 drive for thinness, bulimia, and total score), cure (negatively related with interpersonal sensitivity, paranoid ideation, and number of previous treatments, and positively related to self-directedness), and causes—ED (positively related to age, duration of the ED, FA, somatization, and total number of psychological symptoms).

--- Table 2 ---

Differences in the IPQ-R scores between diagnostic types and YFAS groups

Table 3 shows the results of the ANOVA comparing the mean scores registered in the IPQ-R scales for the different diagnostic types. The normality assumption for these procedures was valued through Kolmogorov-Smirnov tests, which reported non-significant departures from normality ($p > .05$ for all variables within each diagnostic group). BN and BED were characterized with higher reported scores in the IPQ-R scale timeline, consequences, and emotional representation. These ED types (compared with AN and OSFED) reported higher beliefs of longer duration of the illness, potential worse affectation of the illness, and higher emotional responses related to the illness. The BED type also reported a higher mean score in the IPQ-R dimension cure (patients within this group showed higher confidence levels in the treatment) and causes—risk factor. The BN type had a higher mean score in the IPQ-R cyclical scale, which indicated that these patients tended to consider the progression of their illness may be variable, with alternating states of improvement and worsening. OSFED and BED also reported higher mean scores in the IPQ-R causes—psychological scale.

--- Table 3 ---

Supplementary Table S1 shows the distribution of all causes patients considered may explain their ED. Overall, most patients indicated their ED was mainly caused by psychological and ED-specified causes rather than by external causes. With regards to risk factors, *overwork* was considered the most relevant factor among all ED types, while the *hereditary* factor was more reported by patients with BED and AN than by those with BN or OSFED. For ED-related and psychological causes, a low *self-esteem* and *own behavior* were the most frequently reported causes for all ED types. While *media influence* was pointed out as an important cause for more than 50% of patients with AN and BN, it was barely indicated in BED. The factor *to get attention* was more frequently stated in AN and OSFED than in BN and BED. Interestingly, patients with AN and OSFED were more prone to consider *chance/bad luck* as a possible cause of their ED.

Higher levels of FA were related to higher mean scores in the IPQ-R scales (identity, timeline—duration, consequences, timeline—cyclical, emotional representations and causes—psychological) (Table 4).

--- Table 4 ---

Association between the duration of the ED with the IPQ-R total

Figure 1 contains the Kaplan–Meier function describing the relationship between the duration of the ED and the probability of reporting a higher score in the IPQ-R total scale (above percentile 50 estimated in the sample). The X-axis represents the duration of the illness, and the Y-axis is one minus the cumulative survival function. Dashed lines mark the quartiles estimated in this function ($Q_1=8$, $Q_2=20$, and $Q_3=32$), which indicated that at 8 years duration of the illness 25% of the participants achieved high scores in the IPQ-R total, at 20 years duration 50% had achieved high scores in the IPQ-R total, and at 32 years duration 75% achieved high scores in the IPQ-R total.

--- Insert Figure 1 ---

Path analysis

Figure 2 contains the path diagram with the standardized coefficients obtained in the SEM. Only significant coefficients were retained in the model. Adequate goodness-of-fit was achieved: RMSEA=0.074, CFI=0.901, TLI=0.906, and SRMR=0.080. Table 5 contains the complete results for the coefficients reported in Figure 2 (standard error p-values and 95% confidence interval), and Table S2 (supplementary material) the test for direct, indirect and total effects.

--- Insert Figure 2 ---

--- Insert Table 5 ---

All IPQ-R scales had significant coefficients in the latent variable measuring illness perception, with higher scores reported for the dimensions timeline—duration and consequences, and lower scores for cure and cyclical. The coefficient signals for the IPQ-R scales within the latent class (all positive, except for cure and cyclical) indicated as the level in this underlying construct increased, the illness perception related to the ED increased as well. Higher scores in the FA and duration of illness directly contributed to increasing the likelihood of having a higher illness perception. The FA level was also a mediational variable for other indirect links: lower self-directedness and longer duration of the illness were related with higher FA, which next contributed to increasing the risk of higher illness perception.

Discussion

The present study attempted to provide a better understanding regarding illness perception in patients with ED. To that purpose, we analyzed the relationships between illness perception and ED symptomatology, general psychopathology, motivation, personality traits, and FA symptomatology among patients with different ED diagnostic types. Findings from this study might provide a framework for understanding patient attitudes surrounding ED and adherence to treatment. Thus, the findings could have important clinical and research implications.

As expected, our first main finding revealed an association between illness perception and both ED severity and general psychopathology (measured by means of the EDI-2 and SCL-90R total scores, respectively) in patients with ED. Our results showed that patients with more ED symptoms were also those who perceived their disorder as more chronic, with more negative consequences, cyclical, and more emotionally represented. Likewise, increased general psychopathology was related to perceived chronicity, emotional representations, and representations about the nature of the illness. Patients with greater somatization, interpersonal sensitivity, and depressive symptoms were more likely to have a negative view of the disorder and, therefore, to be concerned about the severity and impact of the disorder on their general functioning. In contrast to a prior study [23], our results were not able to confirm an association between positive perceptions about the control and cure of the disorder and lower levels of depression and anxiety. However, our findings are in line with others suggesting that perceived emotional representations are associated with anxiety level, depression, and psychological distress [4, 22].

Not surprisingly, and consistent with prior literature [21], we found an association between illness perception and motivation for treatment. Perception of negative consequences and emotional distress were the main factors positively associated with motivation for change (i.e., the greater negative consequences and emotional distress perceived, the greater the motivation for change). These results are in line with a previous study [13] showing that high scores on the IPQ-R emotional consequences scale led to a motivational state of contemplation, which suggests that emotional distress might be a strong motivating factor influencing change. In addition, our results also revealed that patients who recognized the identity (labeling) and chronicity of their disorder, as well as the lack of control over it, were those who perceived the greatest impairment from the disorder and the desire for treatment. Therefore, these findings support the need for psychoeducation and motivational enhancement therapy interventions in these patients.

Regarding personality, self-directedness was the trait best associated with illness perception, with the highest-scoring patients having the greatest subjective perception of control and cure of

their ED, and the lowest-scoring patients perceiving their disorder as more chronic, varying over time, and with negative consequences. These results support the use of targeting interventions for promoting the ability to set goals and strategies to achieve them successfully (i.e., self-directedness), which would foster the locus of internal control, decision-making, and an active role in one's healthcare and adherence [47].

Considering ED types, our results support a prior study suggesting patients with BN perceived their disorder as more cyclical than patients with AN, and this may be due to the former having a more cyclical nature of ED symptomatology (restriction–binge–purging), in contrast to a more consistent restrictive symptomatology in AN [22]. We also found that patients with BN or BED had perceived longer duration of ED, more serious consequences, and greater emotional representation in comparison with AN or OSFED. Although these results are inconsistent with a prior study [22] that was not able to find differences, our results are in line with others suggesting that patients with OSFED and AN might have a less realistic perception of their disorder and a lack of insight, as suggested by other authors [48, 49]. This may be due to the fact that, at a pre-contemplative motivational stage, they perceive their disorder as beneficial to their beauty goals [20]. Likewise, Konstantakopoulos et al. (2011) postulated that patients with OSFED or AN may show a deliberate denial of the disorder rather than a lack of insight or illness perception. Other alternative hypotheses could also go beyond mere denial of the ED, suggesting that patients might actually use dissociation as a defense mechanism (i.e., they may rationally understand that they suffer an ED but emotionally not be able to recognize it), which, in turn, may act as a maintenance factor of the disorder.

In addition, our results are in line with a prior study [4] pointing out that ED patients tend to attribute their disorder to psychological factors (such as emotional state, own behavior, low self-esteem, and mental attitudes) rather than external causes. Although mass media influence is considered a well-recognized risk factor for ED [50, 51], our results revealed that this was applicable for AN and BN but not for BED. This finding is especially relevant for the design of

prevention programs that not only take into account AN and BN, as they do currently, but also address other EDs such as BED or OSFED. However, the study reveals that almost 50% of patients with AN considered *chance/bad luck* as a possible cause of their ED, whereas none with BED considered it. This finding supports the idea previously introduced about the need to address the locus of internal control in interventions with ED, specifically with AN.

In terms of FA-related symptoms, the patients with positive scores on the YFAS 2.0 were more likely to assume the label and symptoms of their ED and perceive it as chronic, cyclical, with negative consequences, and emotional representations. These results suggest patients who experience greater compulsivity and loss of control with food intake are those who report the greatest functional impairment in physical, personal, and/or social domains of their lives; therefore, they show the greatest perception of negative consequences of their illness. This is in line with a previous study that found FA as an indicator of ED severity [25].

Finally, another emergent finding was that improved illness perception was best explained by a longer duration of the disorder and the presence of FA-related symptoms. The fact that a longer duration of the disorder is associated with higher illness perception may explain the low levels of motivation at the beginning of treatment and, consequently, the high rates of early dropouts. Other clinical features, such as low self-directedness, high ED severity, and general psychopathology, may play indirect roles in this relationship. Furthermore, the findings revealed that at least half of the patients with ED did not achieve an adequate level of illness perception until after having the disorder for 20 years on average, underlining the relevance of implementing and evaluating interventions aimed at increasing motivation and illness perceptions and representations from an early stage of the disorder.

Limitations and strengths

The present study should be considered within the context of several limitations. First, the small sample size of males did not allow meaningful comparisons in terms of sex or gender. However, it was representative of the usual sex proportion found in clinical practice. Second, the

use of a clinical sample may alter the representativity of the results, given that a great percentage of individuals with ED and low illness perception may not seek treatment; therefore, they are not represented in the sample. Future research could benefit from studying illness perception in ED in a community sample in order to overcome this bias. Third, the sample size, after splitting the total group into diagnostic categories, is quite small. Therefore, the results should be interpreted cautiously. Finally, the cross-sectional design does not allow us to draw conclusions regarding the association between illness perception and treatment adherence, drop-outs, and outcome in patients with ED.

Notwithstanding these limitations, the study also has several strengths that should be noted. As far as we know, this is the first study assessing illness perceptions in different ED types and their association with several clinical, motivational, and personality characteristics. In addition, and to the best of the authors' knowledge, this is the first study examining the association between illness perception and FA. The findings derived from this study might improve our ability to identify the factors that are best associated with illness perception and, thereby, aid in tailoring the best treatment targets.

Conclusions

In conclusion, our findings confirm that greater ED severity and psychopathology were associated with a higher perceived chronicity and emotional distress. Higher scores on self-directedness were associated with greater perceptions of control and cure of the disorder. In general, patients with ED tended to attribute their disorder to psychological factors rather than external causes, although, intriguingly, we also found that almost 50% of patients with AN considered "chance/bad luck" as a possible trigger of their disorder. Patients with BN and BED seemed to have a more realistic subjective perception of their disorder than AN or OSFED. Additionally, those patients with FA-related symptoms perceived more negative consequences of the ED. Furthermore, another main finding suggests that at least half of the patients with ED did not achieve a good level of illness perception until after having the disorder for 20 years on average. In short, illness

perception constitutes a valuable framework towards understanding patients' attitudes about their ED and is a promising approach to promote treatment adherence with relevant clinical and research implications.

Considering all the aforementioned factors, further research should be conducted to complement our results, mainly including a larger sample of different ED diagnoses and males and applying longitudinal designs to analyze whether illness perception is directly related to the response to treatment or could be influenced by malnutrition states. This research may provide further evidence of the need for treatments aimed at increasing illness perception as a step towards individualized psychotherapy.

What is already known on this subject?

Although the role that illness perception plays in the maintenance and treatment adherence of other mental disorders and physical conditions is well-known, little studies have explored and assessed this factor in ED. Furthermore, no study to date have explored the relationship between illness perception and ED symptomatology, general psychopathology, motivation, personality traits, and FA-related symptomatology among patients with different ED diagnostic types.

What your study adds?

Findings from this study might provide a framework for understanding patient attitudes surrounding ED and adherence to treatment. Thus, the findings may have important clinical and research implications.

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Consent to participate: All participants provided signed informed consent.

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Table 1 Descriptive for the sample

		Total (n=104)		AN (n=23)		BN (n=39)		BED (n=19)		OSFED (n=23)		
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>p</i>
Sex	Women	94	90.4%	21	91.3%	35	89.7%	17	89.5%	21	91.3%	.994
	Men	10	9.6%	2	8.7%	4	10.3%	2	10.5%	2	8.7%	
Marital status	Single	78	75.0%	21	91.3%	26	66.7%	11	57.9%	20	87.0%	.082
	Married - in couple	16	15.4%	1	4.3%	8	20.5%	4	21.1%	3	13.0%	
	Divorced - separated	10	9.6%	1	4.3%	5	12.8%	4	21.1%	0	0.0%	
Education	Primary	38	36.5%	6	26.1%	15	38.5%	8	42.1%	9	39.1%	.927
	Secondary	47	45.2%	12	52.2%	18	46.2%	7	36.8%	10	43.5%	
	University	19	18.3%	5	21.7%	6	15.4%	4	21.1%	4	17.4%	
Social index	Mean-high	18	17.3%	4	17.4%	7	17.9%	3	15.8%	4	17.4%	.318
	Mean	22	21.2%	2	8.7%	11	28.2%	7	36.8%	2	8.7%	
	Mean-low	14	13.5%	4	17.4%	6	15.4%	2	10.5%	2	8.7%	
	Low	50	48.1%	13	56.5%	15	38.5%	7	36.8%	15	65.2%	
Employment	Unemployed	62	59.6%	15	65.2%	22	56.4%	11	57.9%	14	60.9%	.918
	Employed	42	40.4%	8	34.8%	17	43.6%	8	42.1%	9	39.1%	
		<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>p</i>
BMI (kg/m ²)		25.04	8.39	16.34	1.63	26.05	5.85	37.21	7.49	21.99	1.89	<.001*
Age (years-old)		30.87	12.76	24.87	8.72	32.23	10.66	43.16	14.63	24.39	9.98	<.001*
Age of onset of ED		18.72	7.67	16.91	3.23	18.08	6.96	23.00	11.24	18.09	7.58	.052
Duration of ED		12.12	11.34	7.96	8.04	14.15	10.15	20.00	15.24	6.34	7.43	<.001*

Note. BMI: body mass index. ED: eating disorder.

AN: anorexia nervosa. BN: bulimia nervosa. BED: binge eating disorder. OSFED: other specified feeding eating disorder.

SD: standard deviation. *Bold: significant difference.

Table 2 Association between clinical measures with illness perception: correlations ($n=104$)

IPQ-R scales→	Identity	Duration	Conseque.	Control	Cure	Cyclical	Emotional	Cause.Risk	Cause.Spe	Cause.Psy	Cause.Oth
Age (years-old)	.008	.174	.238†	-.183	.179	.003	.201	.237†	-.153	-.031	.030
Age of onset (years-old)	-.022	-.183	-.027	-.009	.127	-.067	.142	.021	-.253†	.035	-.182
Duration of ED (years)	.027	.318†	.282†	-.201	.114	.048	.130	.254†	.003	-.060	.156
EDI-2: Drive for thinness	.253†	.414†	.182	-.055	-.140	.199	.207	-.031	.302†	.292†	.110
EDI-2: Body dissatisfaction	.113	.452†	.229	-.196	-.183	.137	.264†	-.005	.114	.181	.046
EDI-2: Interoceptive awareness	.252†	.352†	.236†	-.161	-.087	.302†	.286†	.187	.283†	.219	.298†
EDI-2: Bulimia	.151	.437†	.466†	-.033	.019	.274†	.410†	.156	.304†	.294†	.027
EDI-2: Interpersonal distrust	.005	.178	.165	-.172	-.069	.113	.158	.020	.138	-.115	.213
EDI-2: Ineffectiveness	.108	.350†	.170	-.305†	-.168	-.001	.270†	.053	.217	.157	.143
EDI-2: Maturity fears	.179	.157	.092	-.063	-.150	.120	.024	.147	.289†	.023	.290†
EDI-2: Perfectionism	.187	.309†	.299†	-.211	-.226	.295†	.235†	.168	.383†	.146	.210
EDI-2: Impulse regulation	.087	.275†	.106	-.067	-.150	.140	.134	.209	.217	.207	.218
EDI-2: Ascetic	.092	.448†	.269†	-.006	-.217	.154	.231	.031	.381†	.230	.167
EDI-2: Social insecurity	.082	.381†	.164	-.240†	-.323†	.095	.206	.108	.318†	.168	.269†
EDI-2: Total score	.214	.525†	.326†	-.220	-.229	.247†	.342†	.142	.393†	.254†	.268†
FA: YFAS-RAD total	.193	.414†	.593†	-.015	.009	.212	.494†	.255†	.231	.225	.182
SCL-90R: Somatization	.304†	.355†	.265†	-.168	-.177	.090	.308†	.239†	.149	.026	.274†
SCL-90R: Obsessive/comp	.070	.235†	.083	-.148	-.128	.065	.124	.225	.178	.044	.139
SCL-90R: Interpersonal sens.	.204	.467†	.252†	-.221	-.254†	.221	.317†	.145	.419†	.194	.315†
SCL-90R: Depressive	.191	.406†	.299†	-.235	-.172	.192	.383†	.211	.280†	.159	.280†
SCL-90R: Anxiety	.223	.233	.140	-.169	-.182	.016	.256†	.214	.092	-.017	.188
SCL-90R: Hostility	.085	.270†	.100	-.034	-.142	-.065	.228	.139	.179	.070	.180
SCL-90R: Phobic anxiety	.228	.069	-.004	-.155	-.215	-.028	.102	.124	.101	-.171	.261†
SCL-90R: Paranoid Ideation	.146	.372†	.103	-.355†	-.281†	.171	.083	.167	.305†	.067	.224
SCL-90R: Psychotic	.222	.358†	.193	-.248†	-.227	.134	.243†	.151	.333†	.108	.219
SCL-90R: GSI score	.238†	.386†	.221	-.231	-.222	.110	.307†	.217	.267†	.070	.290†
SCL-90R: PST score	.256†	.313†	.151	-.225	-.163	.014	.198	.236†	.250†	.033	.289†
SCL-90R: PSDI score	.137	.388†	.250†	-.151	-.190	.197	.350†	.103	.218	.134	.219
TCI-R: Novelty seeking	-.107	.060	.015	.151	.118	.101	-.077	.145	.044	.118	-.136
TCI-R: Harm avoidance	.001	.376†	.231	-.228	-.212	.084	.209	.093	.134	.089	.133
TCI-R: Reward dependence	.000	-.176	-.165	.141	.088	-.066	-.076	.016	-.129	.113	-.256†
TCI-R: Persistence	.081	-.082	-.002	.194	.079	.071	.060	.144	.210	.090	.005
TCI-R: Self-directedness	-.049	-.393†	-.267†	.298†	.235†	-.249†	-.112	-.214	-.369†	-.199	-.257†
TCI-R: Cooperativeness	.036	-.138	.009	.215	.108	.046	.124	-.091	-.211	.125	-.198
TCI-R: Self-Transcendence	.103	-.203	-.049	-.118	.046	.256†	-.092	.141	-.044	-.092	.119
Motivation: Intensity disorder	.316†	.277†	.407†	-.112	-.029	.108	.392†	.204	.049	.063	.112
Motivation: Need of treatment	.127	.200	.367†	.087	.195	.068	.432†	.182	.022	.146	.038
Motivation: Impairment	.322†	.413†	.493†	-.258†	-.210	.141	.409†	.038	.146	.064	.209
Motivation: Personal worry	.071	.132	.380†	.035	.178	.239†	.542†	.148	.139	.094	.078
Motivation: Family worry	.177	-.140	-.106	-.130	-.150	.111	-.086	-.135	.061	-.072	.076
Previous treatments	.178	.240†	.137	.069	-.328†	-.086	.099	-.040	.212	.080	.098

Note. †Bold: effect size into the range mild-moderate ($|R|>.24$) to high-large ($|R|>.37$).

Table 3 Differences of illness perception (IPQ-R scales) between ED diagnostic types

	Descriptives								Post-hoc (pairwise comparisons)											
	AN; <i>n</i> =23		BN; <i>n</i> =39		BED; <i>n</i> =19		OSFED; <i>n</i> =23		AN vs BN		AN vs BED		AN vs OSFED		BN vs BED		BN vs OSFED		BED vs OSFED	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	BN	BN	<i>SD</i>	<i>p</i>	<i> d </i>	<i>p</i>	<i> d </i>	<i>p</i>	<i> d </i>	<i>p</i>	<i> d </i>	<i>p</i>	<i> d </i>	<i>p</i>	<i> d </i>
Identity	7.7	4.2	8.6	3.9	6.6	4.4	8.4	3.7	.411	0.21	.370	0.26	.557	0.18	.079	0.48	.870	0.05	.147	0.45
Duration	9.9	3.5	11.9	3.2	12.2	1.9	10.1	3.4	.017*	0.60†	.020*	0.82†	.814	0.06	.745	0.11	.032*	0.54†	.035*	0.75†
Consequences	10.4	2.3	12.0	2.4	12.4	1.8	10.3	2.0	.009*	0.65†	.006*	0.94†	.841	0.06	.523	0.19	.005*	0.75†	.003*	1.08†
Control	20.3	3.3	20.5	3.5	19.9	3.2	20.7	2.4	.828	0.05	.719	0.11	.646	0.15	.548	0.16	.765	0.08	.426	0.28
Cure	19.1	3.5	18.9	3.8	20.8	2.3	19.3	2.9	.875	0.04	.092	0.59†	.791	0.08	.045*	0.60†	.649	0.12	.151	0.57†
Cyclical	8.0	2.4	10.6	3.4	9.2	2.4	9.8	2.3	.001*	0.86†	.190	0.48	.031*	0.77†	.079	0.47	.324	0.25	.448	0.28
Emotional	11.4	2.4	12.8	2.1	12.5	1.6	11.7	2.4	.017*	0.62†	.092	0.55†	.682	0.11	.688	0.13	.049*	0.50†	.194	0.42
C-Risk	9.3	2.9	10.5	3.5	11.9	4.2	9.8	3.9	.216	0.37	.023*	0.72†	.655	0.14	.167	0.36	.460	0.19	.063	0.52†
C-Specific	21.6	6.9	22.9	6.8	19.8	5.6	22.1	6.3	.463	0.18	.370	0.29	.787	0.08	.094	0.48	.666	0.11	.249	0.39
C-Psychological	15.0	2.9	16.1	3.7	16.8	2.0	17.0	2.8	.165	0.34	.056	0.73†	.026*	0.71†	.408	0.24	.259	0.28	.833	0.08
C-Other	7.3	2.6	7.0	2.5	6.8	2.7	7.1	2.6	.682	0.11	.522	0.19	.820	0.07	.745	0.09	.878	0.04	.671	0.13

Note. AN: anorexia nervosa. BN: bulimia nervosa. BED: binge eating disorder. OSFED: other specified feeding and eating disorder.

IPQ-R scales: Identity, Timeline-duration, Consequences, Control, Cure, Cyclical, Emotional representation, Cause-Risk factor, Cause-Specific, Cause-Psychological, Cause-Other.

SD: standard deviation. *Bold: significant comparison. †Bold: effect size into the range mild-moderate ($|d|>0.50$) to high-large ($|d|>0.80$).

Table 4 Differences of illness perception (IPQ-R scales) based on the YFAS 2.0 screening score

	YFAS-negative		YFAS-positive		<i>p</i>	<i> d </i>
	<i>n</i> =21		<i>n</i> =83			
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>		
Identity	6.48	4.59	8.35	3.79	.045*	0.51[†]
Timeline	9.05	3.73	11.60	2.91	.001*	0.76[†]
Consequences	9.57	2.54	11.78	2.07	.001*	0.95[†]
Control	20.29	2.43	20.43	3.33	.849	0.05
Cure	19.33	2.59	19.43	3.53	.903	0.03
Cyclical	8.33	2.61	9.89	2.97	.030*	0.56[†]
Emotional representations	9.90	2.45	12.75	1.73	.001*	1.34[†]
Causes-Risk	9.71	4.39	10.48	3.48	.394	0.19
Causes-Specific	19.48	7.54	22.47	6.14	.060	0.43
Causes-Psychological	14.62	4.04	16.61	2.72	.008*	0.58[†]
Causes-Other	6.43	2.52	7.23	2.55	.201	0.32

Note. SD: standard deviation.

*Bold: significant comparison.

[†]Bold: effect size into the range mild-moderate ($|d|>0.50$) to high-large ($|d|>0.80$).

Table 5 Results for the SEM

Structural	Coeff.	SE	z-statistic	p	95%CI Coeff.	
ED-severity						
YFAS severity	0.2603	0.0617	4.22	<.001	0.1394	0.3812
Sexo	-0.1366	0.0535	-2.56	.011	-0.2414	-0.0319
Evolution	-0.2354	0.0556	-4.24	<.001	-0.3443	-0.1266
Self-directedness	-0.6204	0.0515	-12.05	<.001	-0.7213	-0.5195
YFAS severity						
Evolution	0.3028	0.0819	3.70	<.001	0.1423	0.4633
Self-directedness	-0.3143	0.0814	-3.86	<.001	-0.4739	-0.1548
SCL-90R GSI						
Self-directedness	-0.4392	0.0752	-5.84	<.001	-0.5866	-0.2918
IPQ-R						
ED-severity	0.4916	0.0933	5.27	<.001	0.3087	0.6745
YFAS severity	0.3667	0.1079	3.40	.001	0.1552	0.5782
Evolution	0.3186	0.0951	3.35	.001	0.1323	0.5050
Measurement						
IPQ-identity	0.3602	0.0961	3.75	<.001	0.1718	0.5486
IPQ-duration	0.6920	0.0659	10.51	<.001	0.5629	0.8211
IPQ-consequences	0.6731	0.0704	9.56	<.001	0.5352	0.8111
IPQ-control	-0.1650	0.0605	-2.73	.003	-0.2836	-0.0464
IPQ-cure	-0.1529	0.0579	-2.64	.004	-0.2663	-0.0395
IPQ-cyclical	0.2523	0.0991	2.55	.011	0.0580	0.4467
IPQ-emotional	0.5342	0.0909	5.88	<.001	0.3560	0.7123
IPQ-causes.risk	0.3815	0.0978	3.90	<.001	0.1897	0.5732
IPQ-causes.specific	0.4296	0.0892	4.82	<.001	0.2548	0.6044
IPQ-causes.psychology	0.2954	0.1007	2.93	.003	0.0979	0.4928
IPQ-causes.other	0.3544	0.0943	3.76	<.001	0.1696	0.5392

Note. Coeff: standardized coefficient. SE: standard error. 95%CI: 95% confidence interval.

Figure 1 Kaplan-Meier function ($n=104$)

Note. X-axis: duration of the illness (years). Y-axis: one minus cumulative survival function.

Criterion: preoccupation score in the high level (above percentile 50 in the IPQ-R total)

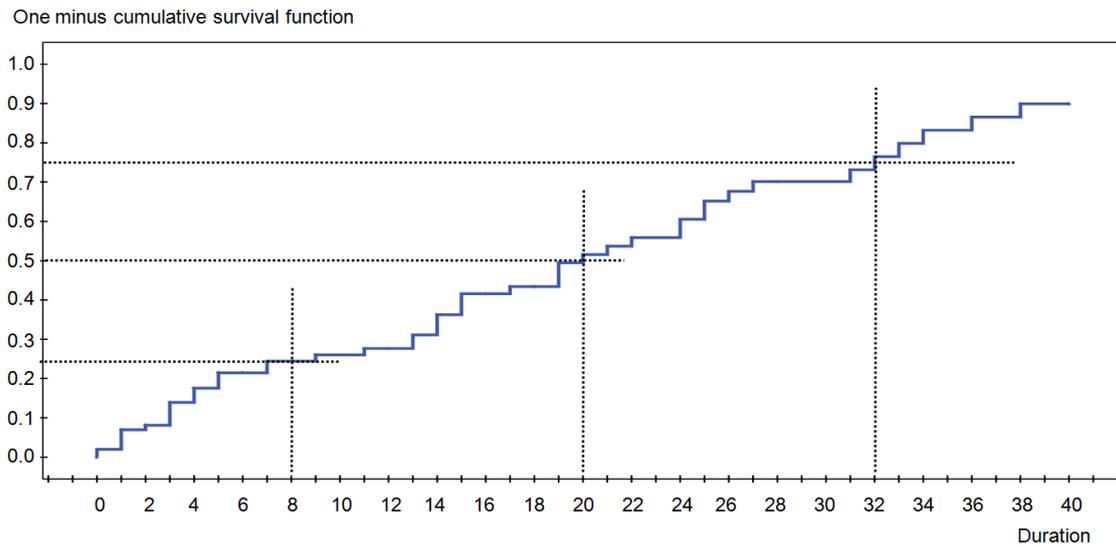


Figure 2 Path-diagram: standardized coefficients ($n=104$)

Note. Only significant coefficients were retained in the model.

