Psychiatry Research 281 (2019) 112561

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Clinical insight in anorexia nervosa: Associated and predictive factors

Philip Gorwood[a,b,c,*], Philibert Duriez[a,b,c], Aiste Lengvenyte[d,e], Sébastien Guillaume[d,f], Sophie Criquillion[a], on behalf of the FFAB network[1]

[a] CMME, Sainte-Anne 's Hospital, GHU Paris, 100 rue de la sante, 75014 Paris, France
[b] Paris Descartes University (University of Paris), Paris, France
[c] U1266, INSERM, Institute of Psychiatry and Neuroscience of Paris (IPNP), Paris, France
[d] Department of Psychiatric Emergency and Acute Care, Lapeyronie Hospital, CHRU Montpellier, Montpellier, France
[e] Faculty of Medicine, Vilnius University, Institute of Clinical Medicine, Psychiatric Clinic, France
[f] INSERM, U1061, Montpellier, France; Université de Montpellier, Montpellier, France

ARTICLE INFO

Keywords:
Eating disorders
Outcome
Prognosis
Depression
Anxiety
Cognitions
Silhouette

ABSTRACT

Clinical and cognitive factors associated with clinical insight regarding both baseline level and its time-related changes, in outpatients treated for anorexia nervosa. The 193 participants were recruited at 13 French centers specializing in eating disorders (*FFAB network*) and assessed for insight (SAI-ED), body mass index (BMI), eating disorder severity, symptoms of depression and anxiety, emotional state, silhouette, and functionality; two cognitive tests were also administered. The 137 patients were then re-assessed 18 weeks later. Minimum and ideal subjective BMI and premorbid intelligence were associated with poor baseline insight. Contrary to nearly all other clinical factors, the level of insight revealed no improvement after four months of care. Only the higher value of the minimum lifetime BMI was significantly predictive of increased insight. More positive emotions (PANAS), less symptoms of depression and anxiety (HADS scores), and fewer syndromes (HADS above threshold) were the only factors that covaried with the changes in the level of insight. In conclusion, poor insight has little time variability, contrary to nearly all clinical and cognitive factors. As increased insight is mainly accompanied by improvements in the emotional domain, the latter could represent potential targets for patients with lack of awareness about their eating disorder.

1. Introduction

Lewis (1934) was the first to present a definition of clinical insight, referring to it as "the amount of realization the patient has of his own condition." This concept was later described as a multidimensional concept (David, 1990) including awareness of the illness, attribution of symptoms to the disease, and treatment compliance.

A large range of psychiatric disorders is associated with poor clinical insight (Goldberg et al., 2001). They include schizophrenia (David et al., 1995), mood disorders (Ghaemi et al., 2000; Ghaemi and Rosenquist, 2004; van der Werf-Eldering et al., 2011), dementia (Harwood et al., 2000; Zanetti et al., 1999), addiction (Arbel et al., 2013; Moeller et al., 2010), and eating disorders (Konstantakopoulos et al., 2011).

Patients with anorexia nervosa may be particularly impaired by poor insight (Arbel et al., 2013), as this disorder is characterized by distorted cognitions about body weight and shape and ambivalence about and variability in motivation to recover (Vitousek et al., 1998). Indeed, early descriptions of anorexia nervosa considered an individual's conviction of being fat despite an obvious state of emaciation to possibly be a delusion (Powers et al., 2005). Accordingly, Lasègue (1873) and Bruch (1973) very early on highlighted that a drive for thinness was a key characteristic of anorexia nervosa and was difficult to acknowledge by patients with this disorder.

The quality of insight has been proven to be of clinical relevance in the treatment and prognosis of psychiatric disorders. A lack of insight has been associated with a poorer quality of life (Dias et al., 2008), diminished psychosocial functioning (Yen et al., 2007), capacity status (Owen et al., 2009), less therapeutic compliance (Kao and Liu, 2010),

* Corresponding author at: CMME, Sainte-Anne 's Hospital, GHU Paris, 100 rue de la sante, 75014 Paris, France.
E-mail address: p.gorwood@ghu-paris.fr (P. Gorwood).

[1] The FFAB network is the national network of health care providers working in eating disorders in France and includes the following as co-authors in the context of this research: Pr Nathalie GODART, Paris, Pr Sébastien GUILLAUME, Montpellier, Dr. Sylvain LAMBERT, Nantes, Dr F.CHEVALLIER-LATREUILLE, Rennes, Dr Brigitte REMY, Paris, Dr Q.BARROIS, Dijon, Dr. M.DELORME, Bordeaux, Pr Catherine MASSOUBRE, Saint-Etienne, Pr Vincent DODIN, Lilles, Dr Guillaume LAVOISY, Paris, Dr Sophie CRIQUILLION, Paris, Dr Sylvan ICETA, Lyon, Dr C FAYOLLET, Paris, Pr Philippe NUBUKPO, Limoges, Dr Florat BAT, Marseille

https://doi.org/10.1016/j.psychres.2019.112561
Received 3 May 2019; Received in revised form 6 September 2019; Accepted 6 September 2019
Available online 09 September 2019

reduced cognitive performance (van der Werf-Eldering et al., 2011), and more severe symptoms of an underlying psychiatric disorder (Cairns et al., 2005; Mintz et al., 2003). Furthermore, enhancing motivation through specific (such as motivational interviews) and non-specific interventions is considered to be essential in the treatment of eating disorders (MacDonald et al., 2012; Denison-Day et al., 2018). The factors underlying a low level of initial insight are not well understood. Moreover, considering the lack of prospective studies, the possible drivers of insight improvement have rarely been analyzed. As indicated in a recent meta-analysis, the effectiveness of specialized treatments for anorexia nervosa has not improved over the past 40 years, and even though such treatments are relatively effective at returning patients to a healthy weight in the short term, they have no more impact on cognitive (psychological) symptoms and weight in the long term than non-specialized treatment (Murray et al., 2018). Therefore, factors associated with improved insight could constitute interesting targets for intervention in patients with a low level of motivation for treatment.

The analysis in this paper was facilitated by the development of a valid and easily applicable instrument for the assessment of insight in anorexia nervosa: the Schedule for the Assessment of Insight for EDs (SAI-ED), a short (seven items) self-report questionnaire, which is easy to fill-in and compute (Konstantakopoulos et al., 2011). We decided to use the French network of treatment centers specialized in eating disorder and evaluate the insight of a number of patients diagnosed with anorexia nervosa twice, on average 18 weeks apart. We focused on three aspects, namely the consequences of anorexia nervosa on functionality, the potentially associated traits of depression and anxiety, and cognitions (efficiency and cognitive flexibility only). We generated the hypothesis that insight is closely linked to these three elements, meaning that (1) patients with baseline poor insight are more anxious or depressed and have more cognitive impairment; (2) that these three aspects are predictive of a poorer improvement of insight; and finally (3) that all factors improve with increasing insight.

2. Methods

2.1. Instruments

The clinical diagnosis of anorexia nervosa in the respondents in this study was verified by psychiatrists with at least five years expertise in eating disorders. They used a list of DSM-5 criteria and assessed the patients during a face-to-face interview at each site. Clinical assessments also inquired about present, subjective ideal, and lifetime (since puberty, if present) minimum and maximum BMI, age at onset of anorexia nervosa, and the presence of a familial history of this disorder (checked through the proband only). Minimum and maximum BMI respectively serve as abbreviations of lifetime lowest and lifetime highest BMI in the rest of this text for reasons of simplicity.

A set of specific questionnaires and tests was provided to every patient with an established diagnosis after obtaining their consent during the first visit. All tests except one (the National Adult Reading test (NART)) were repeated during the second (follow-up) session.

Insight was assessed through the SAI-ED self-report questionnaire (Konstantakopoulos et al., 2011), with the possible answers being positive, negative or unsure: 1 point was attributed for a positive answer (representing evidence of intact insight) and 0 for other responses. Since a threshold for poor versus preserved insight is usually considered to be useful in clinical practice, we divided patients into two groups, one with those with a score below 4 (corresponding to poor insight) and the other with the respondents who scored higher than or equal to 4 (high insight) (Konstantakopoulos et al., 2011). Even if the SAI-ED questionnaire has not been fully validated, it has been demonstrated to have a significant level of internal consistency (Cronbach's α 0.77). The French version was adopted after forward and backward translation of the scale. The Cronbach's α was determined to be “acceptable” (0.63) in the present sample. Eating disorder symptomatology was assessed using a French version of the Eating Attitudes Test-26 (EAT-26) (Garner and Garfinkel, 1979; Leichner et al., 1994). There are three subdivisions of the EAT-26, which distinguishes “bulimia,” “dieting,” and “oral control” (Garner and Garfinkel, 1979).

Patient functionality was assessed using the Work and Social Adjustment Scale (WSAS) (Mundt et al., 2002). This instrument assesses the level of impairment in the ability to work, manage the home, engage in social and private leisure activities, and maintain close relationships. The maximum possible score is 40, with lower scores representing better functionality.

Patients also undertook a body image perception test that consisted of viewing a diagram representing the progression of ten female silhouettes (from 1 meaning "very thin” to 10 meaning “very fat”), each corresponding to a specific BMI (Williamson et al., 1993). Patients were then instructed to choose the silhouettes that they perceived to most closely represent their current body image.

Respondents’ crystalline intelligence was assessed by the French version of the NART (Mackinnon and Mulligan, 2005), a proven tool used to measure prior intellectual functioning. The test requires participants to successfully pronounce 50 irregular words that violate the grapheme-phoneme correspondence rules. The Brixton test (Burgess and Shallice, 1997), which has been revealed to reflect cognitive flexibility in various types of patients with anorexia nervosa (Tchanturia et al., 2011), was also administered to the patients involved in this study. During this test, the subject is asked to predict the movements of a blue circle, which changes location after each response. A concept (rule) has to be inferred from its movements to make accurate predictions. Occasionally, the pattern of movement changes, and the participant has to abandon the old concept in favor of a new one. Previous research suggests that there exists no practice effect for this test (Burke et al., 2014).

Depression and anxiety scores were measured with the Hospital and Anxiety Depressive Scale (HADS), a self-report instrument (Zigmond and Snaith, 1983) with seven questions devoted to depression and a further seven to anxiety. This instrument provides quantitative and qualitative data, as, for both depression and anxiety, a score above 8 has been validated for current depressive or anxiety disorder (Bjelland et al., 2002). Because the presence of a depressive or anxious disorder was evaluated both at the beginning and at the end of the protocol, we computed the number of patients in remission from these conditions during the second visit.

The emotional state of the study participants was assessed using the Positive and Negative Affect Schedule (PANAS), a self-report questionnaire that consists of two 10-item scales that reflect positive and negative affects (for example “active” is a positive affect and “guilty” is a negative affect)(Crawford and Henry, 2004). Each item is rated on a 5-point scale, with 1 signifying that words characterize the patient “not at all”, and 5 meaning they “very much” do.

To simplify the comparison of the main socio-demographic aspects of the participants, we divided subjects into groups based on a number of different factors, such as their educational level (university graduates versus below), working activity (full or half-time versus absence), and familial history of eating disorder (having at least one relative at the second-degree diagnosed with anorexia nervosa or bulimia nervosa versus negative).

2.2. Sample

Female patients fulfilling the criteria for anorexia nervosa were screened for inclusion in 13 eating disorders centers throughout France. The care provided can vary between centers, but it consistently includes a multidisciplinary approach, involving both a psychiatrist or a psychologist and a nutritionist or a dietician. All patients are offered at least one recognized psychological approach to eating disorders (family therapy, cognitive-behavioral therapy, interpersonal therapy…), and

psychotropic drugs are prescribed when needed (primarily anti-depressants). Initially, 210 out-patients were included.

We ultimately excluded one center because all ($N = 13$) patients were lost to follow-up, therefore basing our sample on the other 12 centers from all over France, with three located specifically in the Paris region. Each center recruited a minimum of four and a maximum of 37 patients for the current study. Four patients were excluded because there was mandatory data missing, such as their initial BMI ($N = 3$) or their age ($N = 1$).

The target schedule for the second visit was four months after the first visit, but there was room left for flexibility. In the end, the shortest follow-up took place 60 days later, while the longest did not occur until 15 months after the initial evaluation (sd = 77.36); the average delay was close to our target (121.47 days). To address this variability, the delay between visits was included in the analyses, and, if relevant, it was also included in the multivariate approaches.

Of the respondents included in the initial analyses ($N = 193$), 56 patients did not attend the follow-up visit (29,02%). This sample had a center effect ($\chi^2$29.257, df = 12, $p = .004$), more frequently concerned outpatients ($\chi^2 = 12.668$, df = 2, p.002), and was characterized by a higher initial (16.128, sd = 2.966; $F = 5.116$, $p = .025$), minimum (13.919, sd = 2.159; $F = 8.397$, $p = .004$), and highest (21.970, sd = 5.666; $F = 4.441$, $p = .036$) BMI, and fewer positive (26.05, sd = 7.986; $F = 6.534$, $p = .011$) and negative (26.04, sd = 6.641; $F = 55.982$, $p < .001$) emotions according to the results of PANAS (Table 1).

2.3. Statistics

The normal distribution was initially tested for all the main variables (age, BMI, Brixton score, and EAT, NART, HADS, PANAS, and WSAS scores) and was statistically rejected for the majority (Kolmogorov-Smirnov test, $p < .05$). Non-parametric approaches (Mann–Whitney for averages, Fisher exact test for percentages, and Spearman for quantitative variables) were then used, except for the analyses of time-related changes, as in this case all the values had a normal distribution (Kolmogorov–Smirnov test, $p > .05$). The real values are included in the tables (beside rank values) for easier reading. To test the role of all significantly associated variables, logistic regression analyses were used whenever the residual variance had a normal distribution (which was systematically checked before applying).

The problem of multiple testing was taken into account by using multivariate analyses at each stage of our hypotheses: our conclusions were based on these results only, rather than on all the significant statistics assessing all the parameters.

3. Results

The initial sample of 193 patients was first assessed in terms of their level of insight. Applying the categorical approach, 88% of patients ($N = 171$) were classified as having a high level insight (SAI-ED total score > 4). Patients with low insight (score < 4) were younger, with an earlier age at the onset of the eating disorder; they had a lower ideal subjective BMI and a lower NART value and rated themselves as larger than patients with better insight (Table 1). The multivariate approach indicated that the ideal subjective BMI ($\chi^2 = 10.790$, df = 1, $p = .001$) and the NART score ($\chi^2 = 5.241$, df = 1, $p = .022$) were the only features associated with poor insight: these two variables correctly classified 92.7% of patients.

When insight was assessed in a continuous way (Table 2), a significant positive correlation was observed between the level of insight (SAI-ED total score) and different continuous variables including age, present, minimum, and ideal subjective BMI, and the NART, silhouette,

Table 1
Social and clinical characteristics of 193 patients with anorexia nervosa with different level of insight.

	Good insight ($N = 171$)			Poor insight ($N = 22$)			Statistics		
	Average			Average			Fisher exact test	*U*	*p*-value
	Value	Rank	%	Value	Rank	%			
Age	25.86	102.44		18.82	50.64			861.0	**<0.001**
Education (High)			40.48%			18.18%	4.108		0.060
Working (presently)			22.29%			7.69%	1.533		0.304
Familial history of eating disorder (positive)			30.41%			13.64%	3.072		0.215
Subtype (restrictive)			65.81%			50.00%	1.921		0.216
Age at onset (eating disorder)	17.41	100.80		14.27	63.30			1139.5	**0.003**
Age at onset (binging)	19.45	42.84		16.70	27.95			224.5	0.06
Age at onset (purging)	20.05	47.03		14.36	19.41			147.5	**0.001**
BMI (baseline)	15.58	96.25		15.56	102.82			1753.0	0.604
Lifetime minimal BMI	13.46	90.54		13.55	94.68			1536.5	0.333
Lifetime maximal BMI	21.69	92.59		20.34	78.20			1354.0	0.247
Subjective ideal BMI	17.58	96.37		15.69	49.74			755.0	**<0.001**
NART	26.18	102.40		20.50	50.93			867.5	**<0.001**
BRIXTON	32.44	96.33		34.18	102.23			1766.0	0.641
EAT Total	33.79	95.41		37.05	109.34			1609.5	0.271
EAT Dieting	17.80	94.95		21.27	112.91			1531.0	0.156
EAT Bulimia	7.85	97.31		7.73	94.57			1827.5	0.828
EAT Oral	8.13	97.42		8.05	93.70			1808.5	0.768
HADS Anxiety ety score	13.10	97.40		12.45	93.89			1812.5	0.781
HADS anxiety-syndrome (present)			18.71%			27.27%	0.392		0.245
HADS Depression score	8.96	98		8.23	89.2			1709.5	0.485
HADS depression-syndrome (present)			45.03%			40.91%	0.821		0.448
PANAS Positive	28.23	97.68		27.64	91.68			1764.0	0.635
PANAS Negative	32.63	98.01		31.50	89.14			1708.0	0.483
Self rated silhouette	4.30	93.96		5.64	120.61			1361.5	**0.034**
WSAS	22.84	99.71		18.45	75.93			1417.5	0.06

The quality if insight was based on the SAI-ED score below 3 included (poor insight) versus 4 and over (good insight).
BMI = Body mass index, NART = National Adult Reading Test, EAT = Eating Attitudes Test, HADS = Hospital and Anxiety Depressive Scale, PANAS = Positive and Negative Affect Schedule, Silhouette, WSAS = Work and Social Adjustment Scale.

Table 2
Factors correlated to, or associated with, the level of insight in 193 patients with anorexia nervosa.

Patients' baseline characteristics	SAI-ED total score		
	U	Rho (Spearman)	*p*
Age		0.303	**<0.001**
Education (High)	3405.5		**0.018**
Working (presently)	2142.5		0.288
Familial history of eating disorder (positive)	3004.5		**0.029**
Subtype (restrictive)	3367.0		0.607
Age at onset (eating disorder)		0.114	0.114
Age at onset (binging)		0.195	0.167
Age at onset (purging)		0.274	**0.045**
BMI		−0.213	**0.003**
Lifetime minimal BMI		−0.278	**<0.001**
Lifetime maximal BMI		−0.002	0.975
Subjective ideal BMI		0.173	**0.020**
NART		0.383	**<0.001**
BRIXTON		0.007	0.925
EAT Total		0.039	0.586
EAT Dieting		−0.083	0.251
EAT Bulimia		0.212	**0.003**
EAT Oral		0.193	**0.007**
HADS Anxiety score		0.106	0.144
HADS anxiety-syndrome (present)	2854.5		0.763
HADS Depression score		0.014	0.850
HADS depression-syndrome (present)	4496.0		0.779
PANAS (Positive)		0.024	0.744
PANAS (Negative)		0.039	0.588
Self rated silhouette		−0.217	**0.002**
WSAS		0.171	**0.017**

BMI = Body mass index, NART = National Adult Reading Test, EAT = Eating Attitudes Test, HADS = Hospital and Anxiety Depressive Scale, PANAS = Positive and Negative Affect Schedule, Silhouette, WSAS = Work and Social Adjustment Scale.

and WSAS scores. Insight also varied according to the patients' family history and their level of education (Table 2). In the multivariate analysis, the ideal subjective ($t = 4.168$, $p < .001$) and minimum lifetime ($t = 3.184$, $p = .002$) BMI and the NART score ($t = 2.739$, $p = .007$) were the only parameters still significantly associated with poorer insight. With an r^2 of 0.334, around a third of the total variance is explained by these three factors.

For the prospective approach of the protocol, the analyses were restricted to the 137 patients who were assessed at the second visit in average 18 weeks later. A substantial change in the clinical picture of the patients was observed at this time (Table 3): patients had increased BMI and cognitive flexibility; the severity of their eating disorder was reduced; they presented less anxiety and depression at the dimensional and at the syndromic level; they were characterized by more positive emotions; they assessed themselves as larger; and they had an increased level of functioning (Table 3). Interestingly, in a logistic regression analysis taking into account collinearity, the improvement of the Brixton score (Wald $\chi^2 = 9.354$, $p = 0002$) and the choice of a larger silhouette (Wald $\chi^2 = 5.405$, $p = .020$) were the only variables distinguishing the two waves of assessment. The level of insight revealed no statistical improvement, with only 27 patients increasing their insight between meetings.

We then assessed the baseline factors that were predictive of increased insight (gaining at least one point in the SAI-ED total score during the follow-up visit). Only the value of the minimum BMI (15.98 versus 13.98) was significantly higher in patients who presented an improvement of their level of insight (Table 4). This tendency was still observed when a logistic regression analysis was performed for the multivariate conclusion (Wald ($\chi^2 = 4.485$, $p = .034$), with a minor capacity to predict such improvement ($r^2 = 3.6\%$).

The next step of our analysis involved determining which factors' changes were most correlated (covarying) with the modifications observed in the level of insight over time (Table 5). Increased insight was correlated with increased PANAS positive emotions and decreased HADS-anxiety and HADS-depression scores: at a qualitative level, this involved an improvement of the positive PANAS score and caused the HADS scores to move below the threshold for depressive and anxiety disorders. Within the linear regression analysis based on these different factors, only values below the threshold for anxiety disorders were significantly associated with increased insight ($p = .046$), and the r^2 of the model was relatively low (9.7%).

As there is a wide variance in the ages represented in our sample (which makes sense considering that the 13 centers have variable recruitment methods), we reanalyzed the datasets restricting the analyses to adults only (i.e. aged 18 years or older). Some differences were observed (see appendixes for details), and the following similarities became clear: (1) the ideal BMI and NART values continue to explain a large percentage (93.5%) of poor insight (Table A1', appendix); (2) the ideal subjective and minimum lifetime BMI are still correlated to the level of insight, with these two parameters (along with the NART score) now only explaining 18.1% of the variance- (Table A2', appendix); (3) the Brixton and the silhouette ratings are still largely improved with time, even though they are not retained when collinearity is taken into account (Table A3', appendix); (4) the minimum lifetime BMI remains the most significant variable ($r^2 = 6.4\%$) associated with later increased insight (Table A4', appendix); and (5) the factors covarying with the levels of insight between the two visits are more or less the same (Table A5', appendix).

4. Discussion

The main results of this analysis revealed that poor insight in outpatients diagnosed with anorexia nervosa, assessed qualitatively or quantitatively, was strongly associated with ideal BMI and pre-morbid IQ (NART score) in this sample. After four months of a specialized treatment regime, nearly all clinical and cognitive factors improved, mainly due to increased cognitive flexibility and less body size image distortion. However, intriguingly, the level of insight was rarely improved. Furthermore, we observed only one baseline factor limiting the chances for later increased insight, minimum lifetime BMI, which presented a very limited predictive capacity (<5%). Increased insight between the two visits mainly co-varied with emotional and mood aspects, such as a more positive emotional state and decreased anxiety and mood symptoms and syndromes.

Contrary to our initial non-specific hypothesis, cognitive efficiency might play a role in traits rather than states and does not appear to be a limiting factor for improved insight (the NART score was associated with lower baseline insight but did not predict its time-related changes). The clinical factors involved in the level of insight mainly concerned ideal subjective BMI (associated) and lifetime minimum BMI (prognostic). The results reveal that associated mood and emotional aspects also play a major role, probably as accompanying factors. An improved depressive syndrome, a reduced level of depression, or increased positive emotions, were indeed all associated with improved insight in this study.

At the clinical level, three conclusions could be drawn from this study in which insight was assessed in a prospective manner. Firstly, despite the clinically successful treatment of all clinical and cognitive markers, insight was not improved in the vast majority of patients after an average of four months of specialized care. This discrepancy between clinical and insight improvements has already been demonstrated in studies concerning other psychiatric disorders, such as bipolar disorder (in which treatment outcome was not associated with the level of baseline insight) (Ghaemi et al., 2000) and schizophrenia (in which insight did not necessarily improve while other symptoms did) (Boczkowski et al., 1985; Gunderson et al., 1984; Penn et al., 2009). The concept of insight and the way it is assessed could also explain why

Table 3
Clinical characteristics of 114 patients with anorexia nervosa seen three months apart.

Clinical characteristics	Before follow-up				After follow-up				Statistics		
	Average				Average				*U* (MW)	Fisher exact test	*p*-value
	Average	sd	Rank	%	Average	sd	Rank	%			
Insight (SAI-ED)	5.5203	1.32659	165.549		5.17073	1.5025	150.16		10.895		0.13377
BMI	15.304	1.80071	148.187		16.3247	2.30557	187.822		9879		0.0002
Lifetime minimal BMI	13.329	1.7232	149.102		14.4475	5.70117	159.868		10516.5		0.29543
Lifetime maximal BMI	21.192	3.40094	159.97		22.2679	7.87168	144.132		10141.5		0.12376
Subjective ideal BMI	17.47	1.96226	145.382		17.8523	1.83025	160.779		9806.5		0.13374
BRIXTON	33.374	10.8586	143.762		37.6585	10.3645	184.873		9025		<0.001
EAT Total	34.553	16.5728	176.959		26.0488	17.4553	134.024		8886		<0.001
EAT Dieting	18.382	10.4768	174.378		14.0407	10.3301	137.976		9384		0.00057
EAT Bulimia	7.7398	4.39418	174.715		5.98374	4.88555	137.46		9319		0.0004
EAT Oral	8.4309	4.77542	175.948		6.02439	4.68248	135.571		9081		0.00013
HADS Anxiety score	13.211	4.1375	170.197		11.6016	4.68121	142.984		9998		0.00977
HADS anxiety-syndrome (present)				78.90%				65.90%		7673	0.004
HADS Depression score	9.0407	3.76001	172.448		7.39024	4.08242	139.508		9563.5		0.00175
HADS depression-syndrome (present)				47.20%				30.10%		5.75	0.011
PANAS Positive	29.228	6.73845	147.06		30.6911	7.04334	178.708		9661.5		0.00269
PANAS Negative	35.927	7.8669	158.14		32.4878	9.45946	161.6		11800		0.74292
Self rated silhouette	4.1951	2.57561	150.578		5.07317	2.57405	173.276		10340.5		0.03044
WSAS	23.577	8.20037	169.308		19.2114	10.4366	142.956		9976.5		0.01243

BMI = Body mass index, NART = National Adult Reading Test, EAT = Eating Attitudes Test, HADS = Hospital and Anxiety Depressive Scale, PANAS = Positive and Negative Affect Schedule, Silhouette, WSAS = Work and Social Adjustment Scale.

the level of insight did not change much among treated patients. Insight represents how patients recognize their disorder and potentially also the level of its severity. The overall improvement in eating or weight symptoms could rightly lead patients to rate a decreased need for care. The increase of insight might, therefore, be more difficult to detect following the improvement of these facets in the sample. However, the use of an instrument (SAI-ED) assessing a core aspect of the disorder (ask for care) with dichotomous ratings, may represent a psychometric limit. Another potential explanation is related to the self-report instead of the clinician-based approach, which was used to assess insight in the present study. Indeed, self-report and clinician-based subscales of an instrument assessing insight in schizophrenia (VAGUS) were

Table 4
Characteristics of 123 patients with anorexia nervosa who improved (versus did not) their level of insight after (in average) 4 months of care in eating disorders specialized care centers.

Baseline characteristics	Stable or decreased insight (*N* = 96)				Improved insight (*N* = 27)				Statistics		
	Mean	sd	Average rank	%	Mean	sd	Average rank	%	*U* (Mann–Whitney)	Fisher exact test	*p*
AGE	24.92	8.80	62.71		26.19	15.78	61.79		1324.0		0.905
Education (High)				45.7%				25.0%		3.838	0.079
Working (presently)				22.6%				14.3%		0.704	0.553
Familial history of eating disorder (positive)				69.5%				78.6%		0.879	0.476
Subtype (restrictive)				65.1%				61.5%		0.111	0.817
Age at onset (eating disorder)	17.24	4.65	63.87		16.74	5.53	59.98		1273.5		0.615
Age at onset (binging)	19.45	5.06	27.09		19.62	8.37	26.75		269.5		0.944
Age at onset (purging)	19.82	5.33	28.63		18.92	8.14	26.14		261.0		0.615
BMI	15.23	1.87	60.80		15.56	1.55	70.63		1144.5		0.206
Lifetime minimal BMI	13.14	1.76	54.07		14.02	1.42	72.14		771.5		**0.017**
Lifetime maximal BMI	21.28	3.51	58.40		20.86	3.00	56.56		1089.0		0.807
Subjective ideal BMI	17.53	1.71	59.36		17.24	2.74	50.88		947.0		0.257
NART	26.20	6.35	66.24		23.70	5.78	51.79		1044.0		0.062
BRIXTON	33.66	10.96	64.12		32.37	10.65	59.13		1249.5		0.520
EAT Total	33.80	16.17	61.24		37.22	18.00	69.09		1187.5		0.312
EAT Dieting	17.77	10.27	60.74		20.56	11.12	70.82		1139.0		0.194
EAT Bulimia	7.58	4.35	61.64		8.30	4.58	67.70		1226.5		0.434
EAT Oral	8.45	4.84	62.78		8.37	4.61	63.75		1337.0		0.901
HADS anxiety score	12.89	4.21	60.57		14.37	3.69	71.43		1122.0		0.161
HADS anxiety-syndrome (present)				76.3%				89.3%		2.228	0.188
HADS depression score	9.03	3.67	62.57		9.07	4.12	64.48		1316.5		0.805
HADS depression-syndrome (present)				47.4%				46.4%		0.009	0.999
PANAS (Positive)	29.02	6.92	61.78		29.96	6.13	67.23		1239.5		0.482
PANAS (Negative)	35.27	8.10	60.25		38.26	6.61	72.52		1091.5		0.114
Self rated silhouette	4.20	2.58	62.68		4.19	2.62	64.13		1326.5		0.851
WSAS	23.80	7.82	63.59		22.78	9.57	60.96		1301.0		0.735
Between visits delay	126.4	84.9	64.13		111.7	62.5	54.44		1092.0		0.212

BMI = Body mass index, NART = National Adult Reading Test, EAT = Eating Attitudes Test, HADS = Hospital and Anxiety Depressive Scale, PANAS = Positive and Negative Affect Schedule, Silhouette, WSAS = Work and Social Adjustment Scale.

Table 5
Factors covarying with the level of insight between two visits of 123 patients with anorexia nervosa in specialized treatment centers.

Variables	Statistics		
	rho	*U* (MW)	*p*
Age	−.129		.157
BMI (difference)	−.094		.302
Subjective ideal BMI (difference)	.131		.192
Brixton (difference)	.011		.907
Brixton score (improved)		1518.5	.314
EAT Total (difference)	.084		.357
EAT Dieting (difference)	.053		.558
EAT Bulimia (difference)	−.119		.190
EAT Oral (difference)	.075		.412
HADS anxiety (difference)	.212		**.019**
Anxiety (in remission)		789	**.015**
HADS depression (difference)	.190		**.036**
Depression (in remission)		1139.5	**.041**
PANAS negative (difference)	.116		.200
PANAS negative (improved)		1416	.212
PANAS positive (difference)	−.177		**.050**
PANAS positive (improved)		1403	**.025**
Self rated silhouette (difference)	.029		.747
Self rated silhouette (improved)	1690.5		.301
WSAS (difference)	.164		.700
WSAS (improved)		1349	.065
Between visits delay	−.031		.731

BMI = Body mass index, NART = National Adult Reading Test, EAT = Eating Attitudes Test, HADS = Hospital and Anxiety Depressive Scale, PANAS = Positive and Negative Affect Schedule, Silhouette, WSAS = Work and Social Adjustment Scale.

moderately correlated (Jeong et al., 2017), therefore potentially providing divergent results (Rozalski and McKeegan, 2019). On the other hand, self-reported data may give valuable information which is not accessible through clinician-based assessments, such as patient's unique beliefs and values (Cleary et al., 2014; Karow et al., 2008; Uher et al., 2012), and may be advantageous in uncovering the multidimensional nature of insight (Ouzir et al., 2012). Furthermore, a strong correlation was observed between clinician-rated and self-report ratings when the analyses are restricted to the *global* score of insight (Jeong et al., 2017). As all analyses performed here were based on the total score of SAI-ED, the self-report type of rating used in the protocol might have a limited impact on our results.

Secondly, there are very few known factors that preclude the possibility of improving insight, and the only one in our sample (minimum BMI) had a very low capacity of prediction. This is an important observation for clinicians, as it could mean that there is no objective marker to determine which patients have the lowest chance of improved insight. Improved mood and anxiety aspects were strongly associated with increased insight, and indeed, negative affects and mood symptoms have long been considered important target when providing effective treatments (Haynos et al., 2017; Solmi et al., 2018). In another study performed on patients with bipolar disorder, depressive symptoms were predictive of poorer insight (van der Werf-Eldering et al., 2011). Therefore, targeting mood and anxiety could be important to improve the insight of patients who are not sufficiently aware of their disorder and its severity to request care.

Thirdly, premorbid IQ was highly associated with the level of baseline insight in our sample, contrary to the results of a previous study on insight in anorexia nervosa (Konstantakopoulos et al., 2011). This is possibly because of the differences between these samples (only anorexia nervosa out-patients are considered in the present sample while a mix of anorexia nervosa and bulimia nervosa in- and out-patients are analyzed in the aforementioned study). However, our findings are comparable to previous studies concerning schizophrenia (Aleman et al., 2006; Gerretsen et al., 2013). Notably, in a sample of patients with schizophrenia aged 60 years or more, the level of insight was better explained by premorbid intellectual function (24% of the total variance) than illness severity (16% of the variance) (Gerretsen et al., 2013). Concerning cognitive flexibility, we found that the changes in the Brixton test scores played only a very limited role in predicting an increase in insight. The Wisconsin card sorting test (WCST) has previously been associated with clinician-rated unawareness of illness but not self-rated insight (Trevisi et al., 2012). The Brixton score might, therefore, be insufficiently sensitive. However, among different tests used to detect the level of impairment of patients with anorexia nervosa, the Brixton test has been rated as one of the strongest (Tchanturia et al., 2004).

In accordance with the fact that our study sample was recruited from real-life treatment settings, this work has some important limitations. Firstly, the attrition rate was relatively high (around 29%), and our sample was largely heterogeneous, especially regarding age, and therefore not necessarily representative. Of the participants in our study, 29 were minors, and the SAI-ED scale has not been validated in this age group, limiting the generalizability of our results. Underage study participants were also overrepresented in the low baseline insight group, confirming our general finding that insight increases with age. Notably, after we excluded this group from the total sample, the results did not differ significantly. Moreover, the patients that were lost to the follow-up had significantly less positive and negative emotions based on their PANAS results. This point is somewhat concerning, as emotional avoidance has been demonstrated to be associated with poorer treatment outcomes (Seidel et al., 2018). However, these patients had no other differences in clinical criteria that would indicate differences in disease severity. Moreover, most of the attrition rates of studies on anorexia nervosa ranged between 20% and 40% (Dejong et al., 2012), averaging around 30% (Abdelbaky et al., 2013). Even though this attrition rate is in a “normal” range, it is important to acknowledge that it limits the capacity to generalize our results.

A number of other factors that have been previously revealed to be correlated with insight and that could have been interesting to assess are missing in the present analysis. Notably, this study does not use other assessments of cognitive flexibility (such as the TMT or the Wisconsin test), other cognitive functions, such as memory (Nair et al., 2014), and executive function (Nair et al., 2014) and does not include any aspect of social cognitions. Psychiatric and addictive comorbidity (Yen et al., 2009); prescribed psychotropic drugs (Catapano et al., 2010); or associated personality disorders (Catapano et al., 2010). Social cognitions might be particularly lacking in the present analyses, as being correlated to insight in different psychiatric disorders (Béland and Lepage, 2017; Vaskinn et al., 2013), and relatively independent from the neuro-cognitive tests used in this protocol. Actually, a two-factor model representing ‘social cognition’ and ‘neurocognition’ as separate constructs fitted the data of 100 patients with schizophrenia significantly better than a one-factor model (Sergi et al., 2007).

The use of psychotherapy that aims to increase insight was also not discussed, although this element could also be considered significant. The list of items assessed in this study was already relatively long and increasing it could have potentially impacted the recruitment process and the already high attrition rate. Moreover, the study sample was relatively large but unselected, reflecting real-life clinical settings. Studies more focused on rigorously selected samples could be a valuable approach to specific domains of insight in eating disorders. A possible study target could be patients with delusional ideas and a lack of awareness of their illness. Interestingly, around 20% of patients with anorexia nervosa were considered as having delusional eating beliefs (Steinglass et al., 2007). Taking into account the complex overlap between anorexia nervosa, obsessive-compulsive disorder (Starcevic and

Brakoulias, 2014), and disorders on the autism spectrum (Karjalainen et al., 2019) would require a specific study.

This study was also somewhat limited by the fact that all the univariate statistics were non-parametric due to the absence of normal distribution. This might have impacted the statistical possibility of detecting less important but nonetheless significant factors. However, a number of factors emerged, in this relatively heterogenous sample, that explain a fairly large proportion of the total variance, and making sense at a clinical level. This supports the use of a type of statistical method designed for non-normally distributed parameters.

Finally, refeeding is associated with improvements in various cognitive and behavioral symptoms of anorexia nervosa. However, in the current study, we did not detect a significant correlation between insight and BMI, in accordance with a previous cross-sectional study (Konstantakopoulos et al., 2011). Nevertheless, the relatively short follow-up period in our study precludes the capacity to detect the benefits of long-term weight gain. It is conceivable that the level of weight restoration during this period was not sufficient to impact the level of insight. Future studies with longer follow-up periods are needed to explore the association between refeeding and insight levels more precisely.

In conclusion, the level of insight did not change much during the treatment of the respondents in this survey. However, the improvement of the different facets of depression and anxiety was accompanied by an improvement of insight. Non-specific techniques are frequently used (such as a motivational interview) for patients with poor insight, but it might be interesting to focus directly on depression and anxiety symptoms, as they represent the most covarying factors according to the present cohort.

Declaration of Competing Interest

Philip Gorwood has a paid position at the Paris Descartes University and at Sainte-Anne's Hospital. During the last five years, he has received research grants from Eli Lilly, Ethypharm, and Servier and fees for presentations at congresses and participation in scientific boards organized by Alcediag-Alcen, Bristol-Myers-Squibb, Ethypharm, Janssen, Lilly, Lundbeck, Otsuka, and Servier. The other authors have no conflict of interest

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.112561.

Appendix

Table A1
Social and clinical characteristics of 163 adult patients with anorexia nervosa with different level of insight.

	Good insight (N = 152)			Poor insight (N = 11)			Statistics		
	Average			Average			Fisher exact test	U	p-value
	Value	Rank	%	Value	Rank	%			
Age	26.576	83.5		23	61.2			607	0.129
Education (High)			45.27%			36.36%	0.334		0.402
Working (presently)			23.29%			10.00%	1.121		0.298
Familial history of eating disorder (positive)			32.21%			9.09%	3.153		0.097
Subtype (restrictive)			62.77%			27.27%	5.276		**0.024**
Age at onset (eating disorder)	17.727	82.5		15.636	68.0			682	0.321
Age at onset (binging)	19.647	38.8		18	30.0			182	0.306
Age at onset (purging)	20.108	43.7		15.375	21.4			135.5	**0.012**
BMI (baseline)	15.641	80.5		16.248	103.0			605	0.126
Lifetime minimal BMI	13.391	75.6		13.938	91.1			512.5	0.306
Lifetime maximal BMI	21.73	76.8		20.581	71.1			594.5	0.702
Subjective ideal BMI	17.501	80.0		16.233	56.0			505	0.104
NART	26.993	84.2		22.636	44.4			422.5	**0.006**
BRIXTON	32.457	82.6		30.273	73.3			740.5	0.527
EAT Total	34.629	80.3		43.545	105.8			574.5	0.084
EAT Dieting	18.166	80.1		24.455	107.7			553	0.061
EAT Bulimia	8.1656	80.7		10.273	99.5			643.5	0.201
EAT Oral	8.298	81.7		8.8182	85.9			793.5	0.778
HADS Anxiety score	13.199	80.9		14.818	97.5			666	0.259
HADS anxiety-syndrome (present)			82.12%			90.91%	0.641		0.401
HADS Depression score	9.1523	82.3		8.6364	78.0			792	0.77
HADS depression-syndrome (present)			47.02%			45.45%	0.01		0.586
PANAS Positive	28.132	83.1		25.636	66.4			664.5	0.256
PANAS Negative	32.642	81.6		34.182	87.7			773	0.677
Self rated silhouette	4.3311	79.9		6.2727	110.7			520	**0.035**
WSAS	23.338	83.0		20.273	68.6			688	0.327

The quality if insight was based on the SAI-ED score below 3 included (poor insight) versus 4 and over (good insight).
BMI = Body mass index, NART = National Adult Reading Test, EAT = Eating Attitudes Test, HADS = Hospital and Anxiety Depressive Scale, PANAS = Positive and Negative Affect Schedule, Silhouette, WSAS = Work and Social Adjustment Scale.

Table A2
Factors correlated to, or associated with, the level of insight in 163 patients with anorexia nervosa.

Patients' baseline characteristics	SAI-ED total score		
	U	Rho (Spearman)	*p*
Age		0.156	**0.047**
Education (High)	2823		0.232
Working (presently)	1941		0.437
Familial history of eating disorder (positive)	2193.5		**0.036**
Subtype (restrictive)	2436		0.380
Age at onset (eating disorder)		−0.009	0.914
Age at onset (binging)		0.096	0.412
Age at onset (purging)		0.218	**0.049**
BMI		−0.270	**0.000**
Lifetime minimal BMI		−0.335	**0.000**
Lifetime maximal BMI		−0.064	0.432
Subjective ideal BMI		0.103	0.200
NART		0.333	**0.000**
BRIXTON		0.079	0.317
EAT Total		−0.019	0.808
EAT Dieting		−0.152	0.052
EAT Bulimia		0.157	**0.045**
EAT Oral		0.158	**0.044**
HADS Anxiety score		0.038	0.628
HADS anxiety-syndrome (present)	2972.5		0.244
HADS Depression score		−0.056	0.481
HADS depression-syndrome (present)	4496		0.779
PANAS (Positive)		0.074	0.351
PANAS (Negative)		−0.047	0.552
Self rated silhouette		−0.238	**0.002**
WSAS		0.117	0.136

BMI = Body mass index, NART = National Adult Reading Test, EAT = Eating Attitudes Test, HADS = Hospital and Anxiety Depressive Scale, PANAS = Positive and Negative Affect Schedule, Silhouette, WSAS = Work and Social Adjustment Scale.

Table A3
Clinical characteristics of 106 adult patients with anorexia nervosa seen three months apart.

Clinical characteristics	Before follow-up				After follow-up				Statistics		
	Average				Average				*U* (MW)	Fisher exact test	*p*-value
	Average	sd	Rank	%	Average	sd	Rank	%			
Insight (SAI-ED)	5.625	1.2818	142.06		5.292	1.413	124.137		7487.5		0.057
BMI	15.679	2.324	123.01		16.538	2.285	159.813		6685		**0.000**
Lifetime minimal BMI	13.42	1.997	123.39		14.687	5.876	137.119		7127.5		0.146
Lifetime maximal BMI	21.694	4.649	133.65		22.269	8.074	123.547		7425		0.285
Subjective ideal BMI	17.419	1.873	124.06		17.786	1.782	137.814		7108		0.148
BRIXTON	32.214	11.74	122.00		37.140	10.954	156.051		6521.5		**0.000**
EAT Total	35.343	16.308	150.17		27.401	17.306	113.15		6329		**0.000**
EAT Dieting	18.674	10.168	147.77		14.700	10.377	116.799		6719.5		**0.001**
EAT Bulimia	8.319	4.5956	148.18		6.4672	4.972	116.182		6653.5		**0.001**
EAT Oral	8.3496	4.864	148.86		6.233	4.594	115.136		6541.5		**0.001**
HADS Anxiety score	13.325	3.888	144.27		11.934	4.637	120.731		7126.5		**0.015**
HADS anxiety-syndrome (present)				82.82%				31.13%		7.005	**0.006**
HADS Depression score	9.13	4.085	146.963		7.584	4.084	116.604		6689		**0.002**
HADS depression-syndrome (present)				47.24%				31.13%		6.996	**0.006**
PANAS Positive	27.938	7.56837	123.89		30.632	7.111	152.085		6828		**0.004**
PANAS Negative	32.809	8.58333	132.218		33.292	9.205	139.278		8185.5		0.467
Self rated silhouette	4.484	2.78523	83.3988		5.037	2.589	214.869		228		**0.000**
WSAS	23.147	8.99261	144.454		19.723	10.262	119.048		6935		**0.009**

BMI = Body mass index, NART = National Adult Reading Test, EAT = Eating Attitudes Test, HADS = Hospital and Anxiety Depressive Scale, PANAS = Positive and Negative Affect Schedule, Silhouette, WSAS = Work and Social Adjustment Scale.

Table A4
Characteristics of 106 patients with anorexia nervosa who improved (versus did not) their level of insight after (in average) 4 months of care in eating disorders specialized care centers.

Baseline characteristics	Stable or decreased insight (N = 83)				Improved insight (N = 23)				Statistics		
	Mean	sd	Average rank	%	Mean	sd	Average rank	%	U (Mann–Whitney)	Fisher test	p
AGE	26.493	8.332			29.173	16.372			922.5		0.806
Education (High)				29.63%				14.29%		3.575	0.050
Working (presently)				22.78%				14.29%		0.774	0.301
Familial history of eating disorder (positive)				15.63%				25.00%		1.186	0.212
Subtype (restrictive)				18.97%				26.32%		0.716	0.273
Age at onset (eating disorder)	17.674	4.682			17.956	6.335			927.0		0.832
Age at onset (binging)	19.878	4.815		20.928	9.425				244.5		0.759
Age at onset (purging)	20.062	5.159			20.923	9.393			246.5		0.780
BMI	15.316	1.937			15.741	1.573			815		0.285
Lifetime minimal BMI	13.122	1.825		14.217	1.595				515		0.023
Lifetime maximal BMI	21.438	3.520		21.381	3.413				770		0.999
Subjective ideal BMI									769		0.669
NART	27.301	5.807			25.173	4.867			724		0.076
BRIXTON	33.180	11.468			32.304	11.210			927.5		0.836
EAT Total	35.626	14.812			39.695	17.874			824.5		0.319
EAT Dieting	18.626	9.629		21.869	11.410				790.5		0.208
EAT Bulimia	8.132	4.140		9.130	4.475				823.5		0.313
EAT Oral	8.867	4.940			8.695	4.138			948.5		0.963
HADS anxiety score	13.156	4.097			15.173	2.886			702.5		0.053
HADS anxiety-syndrome (present)				5.26%				25.29%		4.662	0.044
HADS depression score	9.277	3.686		9.608	3.893				899.5	0.672	
HADS depression-syndrome (present)				20.75%				22.64%		0.056	0.500
PANAS (Positive)	29.192	7.162			29.565	6.185			911.5		0.741
PANAS (Negative)	35.867	7.605			39.478	5.035			685		0.039
Self-rated silhouette	4.265	2.650			4565	2.936			916		0.766
WSAS	24.313	7.920			24.260	8.291			945.5		0.945
Between visits delay	130.231	87.5149			117.227	68.218			764.5		0.273

Table A5
Factors covarying with the levels of insight between two visits of 123 patients with anorexia nervosa in specialized treatment centers.

Variables	Statistics		
	rho	U (MW)	p
Age	−0.059		0.551
BMI (difference)	−0.037		0.711
Subjective ideal BMI (difference)	0.136	0.208	
Brixton (difference)	0.026		0.792
Brixton score (improved)		1165	0.446
EAT Total (difference)	0.127		0.195
EAT Dieting (difference)	0.109		0.267
EAT Bulimia (difference)	−0.108		0.269
EAT Oral (difference)	0.087		0.373
HADS anxiety (difference)	0.220		**0.024**
Anxiety (got in remission)		525.5	**0.011**
HADS depression (difference)	0.197		**0.043**
Depression (got in remission)		773	**0.012**
PANAS negative (difference)	0.123		0.209
PANAS negative (improved)		1053.5	0.190
PANAS positive (difference)	−0.179		0.066
PANAS positive (improved)		1039.5	**0.032**
Self-rated silhouette (difference)	0.025	0.800	
Self-rated silhouette (improved)	1248.5	0.311	
WSAS (difference)	0.159		0.105
WSAS (improved)		1008	0.103
Between visits delay	−0.008		0.932

BMI = Body mass index, NART = National Adult Reading Test, EAT = Eating Attitudes Test, HADS = Hospital and Anxiety Depressive Scale, PANAS = Positive and Negative Affect Schedule, Silhouette, WSAS = Work and Social Adjustment Scale.

References

Abdelbaky, G., Hay, P., Touyz, S., 2013. Factors associated with treatment attrition in anorexia nervosa: a systematic review. OA Evid.-Based Med. 1 (1), 8.

Aleman, A., Agrawal, N., Morgan, K.D., David, A.S., 2006. Insight in psychosis and neuropsychological function: meta-analysis. Br. J. Psychiatry 189, 204–212.

Arbel, R., Koren, D., Klein, E., Latzer, Y., 2013. The neurocognitive basis of insight into illness in anorexia nervosa: a pilot metacognitive study. Psychiatry Res. 209 (3), 604–610.

Béland, S., Lepage, M., 2017. The relative contributions of social cognition and self-reflectiveness to clinical insight in enduring schizophrenia. Psychiatry Res. 258,

116–123.
Bjelland, I., Dahl, A.A., Haug, T.T., Neckelmann, D., 2002. The validity of the hospital anxiety and depression scale. An updated literature review. J. Psychosom. Res. 52 (2), 69–77.
Boczkowski, J.A., Zeichner, A., DeSanto, N., 1985. Neuroleptic compliance among chronic schizophrenic outpatients: an intervention outcome report. J. Consult. Clin. Psychol. 53 (5), 666–671.
Bruch, H., 1973. Eating disorders: oObesity, anorexia nervosa, and the person within: bBasic books.
Burgess, P., Shallice, T., 1997. The Hayling and Brixton Tests. Test manual.
Burke, T., Wynne, B., O'Brien, C., Elamin, M., Bede, P., Hardiman, O., Pender, N., 2014. Retrospective investigations of practice effects on repeated neuropsychological measures of executive functioning. Ir. J. Psychol. 35 (4), 178–187.
Cairns, R., Maddock, C., Buchanan, A., David, A.S., Hayward, P., Richardson, G., Hotopf, M., 2005. Prevalence and predictors of mental incapacity in psychiatric in-patients. Br. J. Psychiatry 187, 379–385.
Catapano, F., Perris, F., Fabrazzo, M., Cioffi, V., Giacco, D., De Santis, V., Maj, M., 2010. Obsessive–compulsive disorder with poor insight: a three-year prospective study. Prog. Neuropsychopharmacol. Biol. Psychiatry 34 (2), 323–330.
Cleary, S.D., Bhatty, S., Broussard, B., Cristofaro, S.L., Wan, C.R., Compton, M.T., 2014. Measuring insight through patient self-report: an in depth analysis of the factor structure of the Birchwood Insight Scale. Psychiatry Res. 216 (2), 263–268.
Crawford, J.R., Henry, J.D., 2004. The positive and negative affect schedule (PANAS): construct validity, measurement properties and normative data in a large non-clinical sample. Br. J. Clin. Psychol. 43 (Pt 3), 245–265.
David, A., 1990. Insight. Lancet 336 (8715), 634.
David, A., van Os, J., Jones, P., Harvey, I., Foerster, A., Fahy, T., 1995. Insight and psychotic illness. Cross-sectional and longitudinal associations. Br. J. Psychiatry 167 (5), 621–628.
Denison-Day, J., Appleton, K.M., Newell, C., Muir, S., 2018. Improving motivation to change amongst individuals with eating disorders: A systematic review. Int. J. Eat Disord. 51 (9), 1033–1050.
Dejong, H., Broadbent, H., Schmidt, U., 2012. A systematic review of dropout from treatment in outpatients with anorexia nervosa. Int. J. Eat. Disord. 45 (5), 635–647.
Dias, V.V., Brissos, S., Frey, B.N., Kapczinski, F., 2008. Insight, quality of life and cognitive functioning in euthymic patients with bipolar disorder. J. Affect. Disord. 110 (1–2), 75–83.
Garner, D.M., Garfinkel, P.E., 1979. The Eating Attitudes Test: an index of the symptoms of anorexia nervosa. Psychol. Med. 9 (2), 273–279.
Gerretsen, P., Mulsant, B.H., Liu, A.Y., Granholm, E., Menon, M., Graff-Guerrero, A., Rajji, T.K., 2013. Insight into illness in late-life schizophrenia: a function of illness severity and premorbid intellectual function. Schizophr. Res. 150 (1), 217–222.
Ghaemi, S.N., Boiman, E., Goodwin, F.K., 2000. Insight and outcome in bipolar, unipolar, and anxiety disorders. Compr. Psychiatry 41 (3), 167–171.
Ghaemi, S.N., Rosenquist, K.J., 2004. Is insight in mania state-dependent?: A meta-analysis. J. Nerv. Ment. Dis. 192 (11), 771–775.
Goldberg, R.W., Green-Paden, L.D., Lehman, A.F., Gold, J.M., 2001. Correlates of insight in serious mental illness. J. Nerv. Ment. Dis. 189 (3), 137–145.
Gunderson, J.G., Frank, A.F., Katz, H.M., Vannicelli, M.L., Frosch, J.P., Knapp, P.H., 1984. Effects of psychotherapy in schizophrenia: II. Comparative outcome of two forms of treatment. Schizophr. Bull. 10 (4), 564–598.
Harwood, D.G., Sultzer, D.L., Wheatley, M.V., 2000. Impaired insight in Alzheimer disease: association with cognitive deficits, psychiatric symptoms, and behavioral disturbances. Neuropsychiatry Neuropsychol. Behav. Neurol. 13 (2), 83–88.
Haynos, A.F., Berg, K.C., Cao, L., Crosby, R.D., Lavender, J.M., Utzinger, L.M., ... Crow, S.J., 2017. Trajectories of higher- and lower-order dimensions of negative and positive affect relative to restrictive eating in anorexia nervosa. J. Abnorm. Psychol. 126 (5), 495–505.
Jeong, S.H., Chung, I.W., Jung, H.Y., Hwang, S.S., Kim, S.H., Youn, T., Chung, J.K., Kim, Y.S., 2017. Comparison of clinician-rated and self-report insight in Korean patients with schizophrenia using Vagus insight scale. Psychiatry Res. 258, 93–100.
Kao, Y.C., Liu, Y.P., 2010. Compliance and schizophrenia: the predictive potential of insight into illness, symptoms, and side effects. Compr. Psychiatry 51 (6), 557–565.
Karjalainen, L., Rastam, M., Paulson-Karlsson, G., Wentz, E., 2019. Do autism spectrum disorder and anorexia nervosa have some eating disturbances in common? Eur. Child Adolesc. Psychiatry 28 (1), 69–78.
Karow, A., Pajonk, F.G., Reimer, J., Hirdes, F., Osterwald, C., Naber, D., Moritz, S., 2008. The dilemma of insight into illness in schizophrenia: self- and expert-rated insight and quality of life. Eur. Arch. Psychiatry Clin. Neurosci. 258 (3), 152–159.
Konstantakopoulos, G., Tchanturia, K., Surguladze, S.A., David, A.S., 2011. Insight in eating disorders: clinical and cognitive correlates. Psychol. Med. 41 (9), 1951–1961.
Lasègue, C., 1873. De l'anorexie hystérique. Arch. Génér. Méd. i, 385–403.
Leichner, P., Steiger, H., Puentes-Neuman, G., Perreault, M., Gottheil, N., 1994. Validation d'une échelle d'attitudes alimentaires auprès d'une population québécoise francophone. Rev. Psychiatr. 39 (1), 49–53.
Lewis, A., 1934. The psychopathology of insight. Br. J. Medical. Psychol. 14, 332–348.
Macdonald, P., Hibbs, R., Corfield, F., Treasure, J., 2012. The use of motivational interviewing in eating disorders: a systematic review. Psychiatry Res. 200 (1), 1–11.
Mackinnon, A., Mulligan, R., 2005. [The estimation of premorbid intelligence levels in French speakers]. Encephale 31 (1 Pt 1), 31–43.
Mintz, A.R., Dobson, K.S., Romney, D.M., 2003. Insight in schizophrenia: a meta-analysis. Schizophr. Res. 61 (1), 75–88.
Moeller, S.J., Maloney, T., Parvaz, M.A., Alia-Klein, N., Woicik, P.A., Telang, F., Goldstein, R.Z., 2010. Impaired insight in cocaine addiction: laboratory evidence and effects on cocaine-seeking behaviour. Brain 133 (Pt 5), 1484–1493.
Mundt, J.C., Marks, I.M., Shear, M.K., Greist, J.H., 2002. The Work and Social Adjustment Scale: a simple measure of impairment in functioning. Br. J. Psychiatry 180, 461–464.
Murray, S.B., Quintana, D.S., Loeb, K.L., Griffiths, S., Le Grange, D., 2018. Treatment outcomes for anorexia nervosa: a systematic review and meta-analysis of randomized controlled trials. Psychol. Med. 1–10.
Nair, A., Palmer, E.C., Aleman, A., David, A.S., 2014. Relationship between cognition, clinical and cognitive insight in psychotic disorders: a review and meta-analysis. Schizophr. Res. 152 (1), 191–200.
Ouzir, M., Azorin, J.M., Adida, M., Boussaoud, D., Battas, O., 2012. Insight in schizophrenia: from conceptualization to neuroscience. Psychiatry Clin. Neurosci. 66 (3), 167–179.
Owen, G.S., David, A.S., Richardson, G., Szmukler, G., Hayward, P., Hotopf, M., 2009. Mental capacity, diagnosis and insight in psychiatric in-patients: a cross-sectional study. Psychol. Med. 39 (8), 1389–1398.
Penn, D.L., Meyer, P.S., Evans, E., Wirth, R.J., Cai, K., Burchinal, M., 2009. A randomized controlled trial of group cognitive-behavioral therapy vs. enhanced supportive therapy for auditory hallucinations. Schizophr. Res. 109 (1–3), 52–59.
Powers, P., Simpson, H., T., M., 2005. Anorexia nervosa and psychosis. Prim. Psychiatry 12, 39–45.
Rozalski, V., McKeegan, G.M., 2019. Insight and symptom severity in an inpatient psychiatric sample. Psychiatr. Q. 90 (2), 339–350.
Seidel, M., King, J.A., Ritschel, F., Boehm, I., Geisler, D., Bernardoni, F., Ehrlich, S., 2018. The real-life costs of emotion regulation in anorexia nervosa: a combined ecological momentary assessment and FMRI study. Transl. Psychiatry 8 (1), 28.
Sergi, M.J., Rassovsky, Y., Widmark, C., Reist, C., Erhart, S., Braff, D.L., Marder, S.R., Green, M.F., 2007. Social cognition in schizophrenia: relationships with neurocognition and negative symptoms. Schizophr. Res. 90 (Feb (1–3)), 316–324.
Solmi, M., Collantoni, E., Meneguzzo, P., Degortes, D., Tenconi, E., Favaro, A., 2018. Network analysis of specific psychopathology and psychiatric symptoms in patients with eating disorders. Int. J. Eat. Disord. 51 (7), 680–692.
Starcevic, V., Brakoulias, V., 2014. New diagnostic perspectives on obsessive-compulsive personality disorder and its links with other conditions. Curr. Opin Psychiatry 27 (1), 62–67.
Steinglass, J.E., Eisen, J.L., Attia, E., Mayer, L., Walsh, B.T., 2007. Is anorexia nervosa a delusional disorder? An assessment of eating beliefs in anorexia nervosa. J. Psychiatr. Pract. 13 (2), 65–71.
Tchanturia, K., Anderluh, M.B., Morris, R.G., Rabe-Hesketh, S., Collier, D.A., Sanchez, P., Treasure, J.L., 2004. Cognitive flexibility in anorexia nervosa and bulimia nervosa. J. Int. Neuropsychol. Soc. 10 (4), 513–520.
Tchanturia, K., Harrison, A., Davies, H., Roberts, M., Oldershaw, A., Nakazato, M., Treasure, J., 2011. Cognitive flexibility and clinical severity in eating disorders. PLoS One 6 (6), e20462.
Trevisi, M., Talamo, A., Bandinelli, P.L., Ducci, G., Kotzalidis, G.D., Santucci, C., Tatarelli, R., 2012. Insight and awareness as related to psychopathology and cognition. Psychopathology 45 (4), 235–243.
Uher, R., Perlis, R.H., Placentino, A., Dernovšek, M.Z., Henigsberg, N., Mors, O., Maier, W., McGuffin, P., Farmer, A., 2012. Self-report and clinician-rated measures of depression severity: can one replace the other? Depress. Anxiety 29 (12), 1043–1049.
van der Werf-Eldering, M.J., van der Meer, L., Burger, H., Holthausen, E.A., Nolen, W.A., Aleman, A., 2011. Insight in bipolar disorder: associations with cognitive and emotional processing and illness characteristics. Bipolar Disord. 13 (4), 343–354.
Vaskinn, A., Sundet, K., Ueland, T., Agartz, I., Melle, I., Andreassen, O.A., 2013. Social cognition and clinical insight in schizophrenia and bipolar disorder. J. Nerv. Ment. Dis. 201 (6), 445–451.
Vitousek, K., Watson, S., Wilson, G.T., 1998. Enhancing motivation for change in treatment-resistant eating disorders. Clin. Psychol. Rev. 18 (4), 391–420.
Williamson, D.A., Cubic, B.A., Gleaves, D.H., 1993. Equivalence of body image disturbances in anorexia and bulimia nervosa. J. Abnorm. Psychol. 102 (1), 177–180.
Yen, C.F., Chen, C.S., Yang, S.J., Ko, C.H., Yen, J.Y., Huang, C.F., 2007. Relationships between insight and psychosocial adjustment in patients with bipolar i disorder. Bipolar Disord. 9 (7), 737–742.
Yen, C.F., Hsiao, R.C., Chen, C.C., Lin, H.C., Yen, C.N., Ko, C.H., Chen, C.S., 2009. The role of insight to alcohol use disorders in insight to schizophrenia. Compr. Psychiatry 50 (1), 58–62.
Zanetti, O., Vallotti, B., Frisoni, G.B., Geroldi, C., Bianchetti, A., Pasqualetti, P., Trabucchi, M., 1999. Insight in dementia: when does it occur? Evidence for a non-linear relationship between insight and cognitive status. J. Gerontol. B Psychol. Sci. Soc. Sci. 54 (2), P100–P106.
Zigmond, A.S., Snaith, R.P., 1983. The hospital anxiety and depression scale. Acta Psychiatr. Scand. 67 (6), 361–370.