

ORIGINAL ARTICLE

The subjective assessment of work and social adjustment impairments and associated psychopathologies in Japanese adult female patients with anorexia nervosa

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Abstract

Aim: Patients with anorexia nervosa (AN) sometimes undergo a chronic course, and they hardly maintain social participation. Work and social adjustment impairments are generally significantly associated with the clinical symptoms of eating disorders. Psychopathologies associated with the subjective social difficulties of patients with AN have been unclear. This study examined the association between AN psychopathologies and work and social adjustment impairments in adult female patients with AN.

Methods: This study included 36 Japanese adult female patients with AN who completed the Work and Social Adjustment Scale (WSAS) and the Eating Disorder Inventory-2 (EDI-2). Spearman's rank correlation coefficient was used to assess correlations between WSAS and EDI-2 or demographic variables.

Results: The mean age was 31.8 years, the mean current body mass index was 13.4 kg/m², and the median illness duration was 5 years. Patients demonstrated social difficulties, especially in social leisure activities. The total WSAS scores were significantly correlated with EDI-2 "impulse regulation" and "asceticism." WSAS "social leisure" was significantly correlated with EDI-2 "bulimia," "interoceptive awareness," "impulse regulation," and "asceticism."

Conclusion: Psychopathologies, such as impulse regulation, asceticism, and interoceptive awareness, may be related factors to social difficulties. Emotion regulation, such as impulse regulation and emotional awareness, could be an important realm of treatment not only for psychopathology but also for social functioning in patients with AN.

KEYWORDS

anorexia nervosa, psychopathology, work and social adjustment

INTRODUCTION

Anorexia nervosa (AN) is a psychiatric illness characterized by energy intake restriction causing a significantly low body weight, which is less than minimally expected, intense fear of gaining weight, and

disturbance in how one's body weight or shape is experienced.¹ Generally, AN sometimes takes a chronic course, and patients with AN barely maintain social participation. One in four people experiencing AN have no paid employment due to psychiatric problems.² Even people who recover from eating disorders (EDs)

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have social-emotional difficulties.³ In Japan, 52.4% of AN restricting type and 66.3% of AN binge-purging type experience leaving their job due to AN.⁴

Recently, subjective and objective social functionings have been investigated in females with AN. Interpersonal and social functioning deficits are well established in females with AN and are thought to be key features involved in disease onset and maintenance.⁵⁻⁸ A systematic review emphasized that greater emotion regulation difficulties, elevated alexithymia, and reduced emotional awareness are evident in AN compared with healthy controls using social cognitive measures.⁸ Schmidt and Treasure recommended the cognitive interpersonal maintenance model for AN.^{9,10} This model proposes that cognitive, socioemotional, and interpersonal elements act together to cause and maintain EDs.

People with AN report finding socioemotional stimuli threatening.¹¹ They report higher sensitivity to punishment than healthy controls.¹² People with AN and bulimia nervosa (BN) report greater difficulties with emotion regulation and show greater attentional biases for social affective cues than controls.¹³ Women with AN find female faces not rewarding and avoided looking at both the faces and eyes independent of observed body weight.¹⁴ They frequently report difficulties with social functioning, particularly interpersonal difficulties.^{5,15} The systematic review of the empirical literature by Arcelus et al. revealed that interpersonal difficulties in people with restrictive behaviors, such as AN, appear to be related to the avoidance or expression of feelings to others and to prioritizing other people's feeling over their own.⁵ Patients with AN have reduced emotional expressiveness, held more negative attitudes toward expressing their emotions, and perceived asking for help as a sign of weakness.⁸ Individuals with AN demonstrated a stronger motivation to avoid dependency and lower strivings for intimacy compared with healthy control and clinical controls, which indicates a pronounced motive of avoiding dependency as a vulnerability factor for AN, and recovered AN patients did not differ from AN patients in the strength of avoidance motivation regarding loss or autonomy.¹⁶

Studies have also investigated how individuals subjectively believe that their illness impairs their everyday functioning. The Work and Social Adjustment Scale (WSAS) is a self-report scale of social and occupational functional impairment attributable to an identified disorder.^{17,18} Patients with AN self-reported significantly more work and social functioning problems than non-ED controls^{19,20} or other EDs.²¹ Total WSAS scores in the AN group were significantly associated with the clinical symptoms of ED (dietary restriction, eating, weight, and shape concerns) and anxiety and depression.¹⁹ Another study reported that social anhedonia, current severity (body mass index [BMI] in kg/m²), and lifetime severity (lowest adult BMI) significantly predicted work/social difficulties.²⁰ The greatest and lowest impairment were reported in the realm of social leisure and home management, respectively.¹⁹⁻²¹ Tchanturia et al. emphasized that the specific reasons why patients with AN report particularly impoverished social lives could not be identified.¹⁹

To our knowledge, the psychopathologies associated with the subjective social difficulties that patients with AN experience have not been investigated.

Aim

This study aimed to examine work and social adjustment impairments and associated psychopathologies of AN.

MATERIALS AND METHODS

This study included Japanese female patients with AN who regularly visited a university hospital in Japan. The BMIs of most patients were approximately ≤ 13 kg/m². Not only adolescent patients but also adult patients with a chronic history of AN attend our hospital. We operate a specialized outpatient clinic for EDs and usually assess the BMI and psychological scales of patients with EDs on the first visit to the hospital.

This study examined the demographic characteristics of the patients and the subsequent psychological assessments administered at the first visit to our hospital. The Medical Ethics Review Committee of Kyoto Prefectural University of Medicine approved this study. The medical chart was retrospectively examined. Participants who did not wish their samples (the demographic characteristics and the psychological assessments) to be used for the study had the opportunity to opt out.

A power analysis assumed a correlation analysis with two tails, with 0.50 effect size, 0.8 power (1- β), and 0.05 alpha error. The required sample size was 29 participants.

Participants

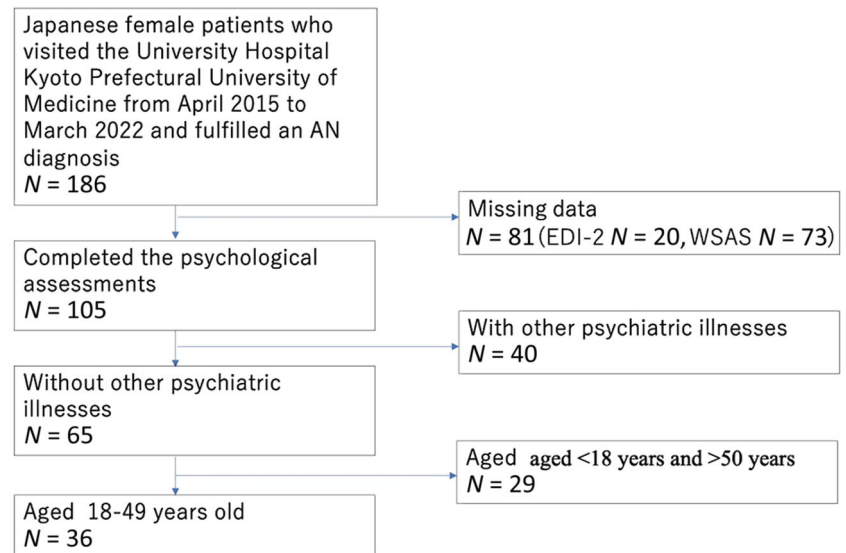
The inclusion criteria were Japanese female patients who visited the University Hospital Kyoto Prefectural University of Medicine from April 2015 to March 2022 and fulfilled an AN diagnosis. The diagnosis was established following the Tenth Revision of the International Statistical Classification of Diseases and Related Health Problems. This study only included patients who completed the psychological assessments and excluded patients with other psychiatric illnesses, as well as patients aged <18 years and >50 years. The study recruited a total of 36 patients (Figure 1).

Measures

1. The Work and Social Adjustment Scale

The WSAS is a simple and brief five-item self-report scale designed to measure the degree of functional impairment attributable to an identified disorder.^{17,18} The scale items encompass different domains of functioning and include the ability to work, carry out home management (cleaning, tidying, shopping, cooking, looking after home or children, and paying bills), participate in social leisure (with other people, e.g., parties, bars, clubs, outings, visits, dating, and home entertaining) and private leisure (done alone, such as reading, gardening, collecting,

FIGURE 1 Flowchart of participants. AN, anorexia nervosa; EDI-2, Eating Disorder Inventory-2; WSAS, Work and Social Adjustment Scale.



sewing, and walking alone), and the ability to form and maintain close relationships using a nine-point Likert scale ranging from 0, indicating no difficulties, to 8, indicating very severe difficulties. The overall maximum total score is 40, where higher scores represent greater work and social functioning difficulties. The WSAS demonstrated good internal consistency and test-retest reliability in depression and obsessive-compulsive disorder.¹⁸ Cronbach's α was 0.95–0.96 in EDs.^{19,20} The WSAS has been indicated as an extremely useful and brief measure to use in routine clinical practice to assess functional impairment alongside other important ED clinical indices.¹⁹

The General Incorporated Association Hokkaido Intellect Tank and Osamu Kobori got permission from the author and translated the Japanese version of WSAS.²² They examined and revealed sufficient retest reliability and validity. Osamu Kobori permitted us to use the Japanese version.

2. The Eating Disorder Inventory-2

The Eating Disorder Inventory (EDI) is a 64-item self-report questionnaire to evaluate the symptoms and psychopathology of EDs.²³ It originally consists of eight subscales, including the drive for thinness, bulimia, and body dissatisfaction, which are items related to ED diagnostic criteria, and ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, and maturity fears, which are items for evaluating psychopathologic traits commonly seen in EDs. Garner added 27 items and three subscales of asceticism, impulse regulation, and social insecurity to EDI and developed EDI-2 in response to the increase in BN prevalence.²⁴ It has been favorably evaluated for reliability and validity.

The Japanese version of EDI-2 is a measuring instrument that is expected to have a satisfactory level of internal consistency (Cronbach's α of 0.71–0.92), except for the asceticism subscale (Cronbach's α of 0.61), as well as high validity as a tool for evaluating the psychopathology of EDs.^{25,26} It has been widely used in clinical studies of EDs in Japan. Tetsuro Tachi permitted us to use the Japanese version.

Statistical analysis

The Shapiro–Wilk test was used to assess the distributions of demographic characteristics, WSAS scores, and EDI-2 scores.

The Mann–Whitney *U* test was used to investigate the differences in the scores of demographic data, EDI-2, and WSAS between AN restricting type (ANR) and AN binge-eating/purging type (ANBP) because these scores may be insufficient to follow a normal distribution.

Spearman's rank correlation coefficient was used to assess the correlations between WSAS and EDI-2 or demographic variables such as age, current BMI, lowest BMI, illness duration, and educational years. We calculated Spearman's rank correlation coefficient because WSAS and EDI-2 scores may be insufficient to follow a normal distribution. Moreover, we adjusted the two-tailed *P*-value for multiple comparisons with the Benjamini–Hochberg method.²⁷ The IBM Statistical Package for the Social Sciences Statistics version 23 for Mac (IBM Corp.) was used for all data analyses, with *P*-values of <0.05 as significant.

RESULTS

This study included 36 participants. Table 1 shows their demographic and clinical characteristics.

Only age and BMI were normally distributed. The mean (standard deviation [SD]) age was 31.8 (9.3). The mean (SD) current and lowest BMI were 13.4 (2.0) and 12.5 (1.9), respectively. The median illness duration was 5 years. The median educational years were 14. Less than half of the participants ($n = 16$, 44%) were employed. Subtypes consisted of ANR ($n = 23$, 66%) and ANBP ($n = 13$, 34%).

EDI-2 and WSAS scores were not normally distributed. Table 2 shows the median WSAS scores. The total score was 19.5/40, with subscores for “work” of 4/8, “home management” of 2/8, “social

TABLE 1 Demographic and clinical characteristics

Age (years), mean (SD)	31.8 (9.3)
Current BMI, mean (SD)	13.4 (2.0)
Lowest BMI, mean (SD)	12.5 (1.9)
Illness duration (year), median (25%, 75%)	5 (3, 11.25)
Years in education (year), median (25%, 75%)	14 (12, 16)
Employed, n (%)	16 (44)
Subtype, n (%)	
Restricting	23 (66)
Binge-eating/purging	13 (34)
EDI-2, median (25%, 75%)	
Drive for thinness	7 (2, 16.25)
Body dissatisfaction	11.5 (7.75, 17.25)
Maturity fears	6 (3.75, 12.5)
Bulimia	2.5 (0, 7.5)
Interoceptive awareness	7 (3, 15)
Ineffectiveness	11 (5.75, 22.5)
Perfectionism	5 (2.75, 7.25)
Interpersonal distrust	7 (3.75, 10)
Impulse regulation	4 (3, 9)
Asceticism	5 (3, 7.25)
Social insecurity	11 (7.75, 13.25)

Abbreviations: BMI, body mass index; EDI-2, Eating Disorder Inventory-2; SD, standard deviation.

TABLE 2 WSAS scores

Total	19.5 (8.75, 30.25)/40
Work	4 (2, 6)/8
Home management	2 (1.75, 5.5)/8
Social leisure	6 (2.75, 8)/8
Private leisure	3 (0, 6)/8
Close relationships	4 (0.75, 6.25)/8

Note: Median (25%, 75%)/maximum score.

Abbreviations: WSAS: Work and Social Adjustment Scale.

leisure" of 6/8, "private leisure" of 3/8, and "close relationships" of 4/8. The greatest impairment was reported in social leisure.

Table 3 shows the demographic data, EDI-2 scores, and WSAS scores of AN subtypes. Demographic data, EDI-2 scores and WSAS scores demonstrated no statistically significant differences, except for illness duration and EDI-2 "bulimia."

Table 4 shows the correlation between WSAS and EDI-2 or demographic variables. The total WSAS was significantly correlated with EDI-2 "maturity fears" (the Spearman's rank correlation coefficient: $r_s = 0.45$, $P < 0.05$), "bulimia" ($r_s = 0.46$, $P < 0.05$),

"interoceptive awareness" ($r_s = 0.49$, $P < 0.05$), "impulse regulation" ($r_s = 0.57$, $P < 0.01$), and "asceticism" ($r_s = 0.56$, $P < 0.01$).

Regarding WSAS subscales, "social leisure" was significantly correlated with EDI-2 "drive for thinness" ($r_s = 0.43$, $P < 0.05$), "maturity fears" ($r_s = 0.44$, $P < 0.05$), "bulimia" ($r_s = 0.55$, $P < 0.01$), "interoceptive awareness" ($r_s = 0.56$, $P < 0.01$), "ineffectiveness" ($r_s = 0.39$, $P < 0.05$), "impulse regulation" ($r_s = 0.55$, $P < 0.01$), and "asceticism" ($r_s = 0.64$, $P < 0.01$). WSAS "private leisure" was significantly correlated with EDI-2 "impulse regulation" ($r_s = 0.49$, $P < 0.05$) and "asceticism" ($r_s = 0.54$, $P < 0.05$). Other WSAS subscales were not significantly correlated with EDI-2 subscales.

No correlations were found between the WSAS total score or each subscale and age, illness duration, minimum BMI, or current BMI.

DISCUSSION

This study revealed that AN had the greatest impairment in the WSAS category "social leisure" and the lowest impairment in the WSAS category "home management," consistent with previous studies.¹⁹⁻²¹ Although a difference was found in illness duration and the EDI-2 category "bulimia," no significant difference was observed between ANR and ANBP regarding WSAS scores, which is consistent with the previous study.²⁰ These results indicate that people with AN have difficulty enjoying leisure, especially in social settings, and support the cognitive interpersonal maintenance model of AN.^{9,10}

This study revealed that neither BMI nor the illness duration was significantly associated with WSAS scores. The result for illness duration is consistent with the previous studies.^{19,20} The result for BMI is consistent with one previous study of AN,¹⁹ but differs from the results of other previous ED research.²⁰ The results for the correlation of BMI and WSAS scores vary among studies, which may be due to the difference in sample size and participants (only AN or with BN). In general, extremely low BMI inhibits patients from participating in social activities due to life crises. However, this study revealed that subjective impairments of work and social life were not significantly related to BMI or illness duration but significantly related to subscale scores of EDI-2. This indicates that psychopathology, rather than BMI or illness duration, may affect subjective disturbances in the social life of patients with AN. Tchanturia et al. revealed that ED symptomatology rather than BMI or illness duration may play an important role in determining how impaired individuals perceive their social and occupational functioning, but were unable to identify the specific reasons for the reported impoverished social lives of patients with AN.¹⁹ This study indicates that some specific psychopathologies may be associated with the social difficulty of patients with AN.

This study revealed that psychopathologies, such as EDI-2 categories "impulse regulation" and "asceticism," were significantly correlated with WSAS total score in a large effect size because effect sizes of ≥ 0.1 are defined as small, ≥ 0.3 as medium, and ≥ 0.5 as large.²⁸ EDI-2 categories "impulse regulation," "asceticism,"

TABLE 3 Demographic characteristics, EDI-2 scores, and WSAS scores of AN subtype

		ANR (n = 23)	ANBP (n = 13)	P-value	Effect size (r)
Demographic data	Age	30 (26, 38)	34 (27, 42)	0.474	0.12
	Current BMI	13 (12.5, 13.9)	13.4 (12.6, 14.5)	0.296	0.18
	Lowest BMI	12.1 (10.7, 13.3)	12.6 (11.4, 13.9)	0.267	0.19
	Illness duration	4 (2, 5)	15 (7, 25)	0.001*	0.6
	Years in education	14 (12, 16)	14 (12, 15)	0.558	-0.1
EDI-2	Drive for thinness	6 (1, 11.5)	12 (7, 17)	0.081	0.29
	Body dissatisfaction	11 (8.5, 17.5)	13 (7, 17)	0.897	-0.02
	Maturity fears	5 (3.5, 12)	9 (6, 14)	0.344	0.16
	Bulimia	0 (0, 3.5)	13 (6, 16)	0.000*	0.64
	Interoceptive awareness	6 (2, 13.5)	8 (5, 18)	0.214	0.21
	Ineffectiveness	9 (4, 23)	17 (8, 22)	0.397	0.14
	Perfectionism	5 (2.5, 7)	6 (3, 8)	0.974	0.01
	Interpersonal distrust	7 (4, 10)	8 (3, 10)	0.871	0.03
	Impulse regulation	3 (3, 8)	5 (3, 9)	0.361	0.16
	Asceticism	4 (3, 7)	6 (5, 8)	0.226	0.21
WSAS	Social insecurity	11 (7, 13.5)	11 (8, 13)	0.922	0.02
	Work	4 (2, 6)	6 (2, 7)	0.07	0.11
	Home management	2 (0.5, 4)	4 (2, 7)	0.537	0.01
	Social leisure activity	3 (2, 8)	7 (6, 8)	0.061	0.32
	Private leisure	2 (0, 5)	6 (0, 6)	0.065	0.1
	Close relationship	3 (0.5, 5)	6 (2, 7)	0.581	0.23
	Total	18 (6.5, 25)	30 (12, 32)	0.19	0.3

Note: Median (25%, 75%), Mann-Whitney *U* test.

**P* < 0.05.

Abbreviations: AN, anorexia nervosa; ANR, anorexia nervosa restricting type; ANBP, anorexia nervosa binge-eating/purging type; BMI, body mass index; EDI-2, Eating Disorder Inventory-2; WSAS, Work and Social Adjustment Scale.

“interoceptive awareness,” and “bulimia” significantly correlated with WSAS category “social leisure” in large effect size.²⁸ The effect size was 0.39–0.64 and the power was 0.78–0.98, which was considered sufficient because of the post hoc power analysis of correlation.

The “impulse regulation” subscale assesses a tendency toward mood instability, impulsivity, recklessness, anger, and self-destructiveness.²⁹ The correlation of “impulse regulation” with “social leisure” and “private leisure” indicates that patients with AN who have difficulty in regulating emotion experience difficulty in enjoying leisure. Previous findings reporting that emotions are dangerous and uncontrollable support this result.³⁰ The correlation between “impulse regulation” and “social leisure” is also supported by low social frustration tolerance in patients with AN.³¹ This may be because individuals with AN may use different strategies to regulate anger/aggression in social situations compared with controls, and may focus aggression on people in the situation and provide fewer solution-focused responses.³¹

“Asceticism” correlated with the WSAS total score, “social leisure” and “private leisure” in large effect size.²⁸ “Asceticism” assesses the tendency to seek virtue through the pursuit of spiritual ideals, such as self-discipline, self-denial, self-restraint, self-sacrifice, and control of bodily urges.²⁹ It includes the possibility to view pleasure, relaxation, and human weakness as shameful.²⁹ Asceticism inhibits appetite and motivates patients to weight loss. This result indicates that asceticism inhibits patients from enjoying leisure activities and supports the previous report on a trend for happiness to be expressed less in AN.⁸ Patients with AN may sometimes be sensitive and fearful of others' reactions due to vulnerable narcissism, then suppress their own emotions, especially negative emotions, and punish themselves.

This study revealed that “interoceptive awareness” correlated with “social leisure.” “Interoceptive awareness” assesses the recognition of emotional states. It includes fear of emotions when emotions are too strong or out of control to respond.²⁹ This result

TABLE 4 Correlation between WSAS and EDI-2 or demographic variables

		WSAS					
		Total	Work	Home management	Social leisure	Private leisure	Close relationship
Demographic variables	Age	0.3	0.22	0.34	0.18	0.29	0.13
	Current BMI	-0.07	-0.16	-0.15	0.05	-0.04	-0.07
	Lowest BMI	0.03	-0.05	-0.13	0.16	0.15	-0.03
	Illness duration	0.25	0.04	0.21	0.27	0.17	0.23
	Years in education	-0.21	-0.06	-0.04	-0.17	-0.23	-0.22
EDI-2	Drive for thinness	0.31	0.15	0.17	0.43*	0.21	0.18
	Body dissatisfaction	0.04	-0.16	-0.13	0.16	0.26	-0.06
	Maturity fears	0.45*	0.41	0.34	0.44*	0.31	0.36
	Bulimia	0.46*	0.15	0.33	0.55**	0.35	0.39
	Interceptive awareness	0.49*	0.36	0.21	0.56**	0.33	0.48
	Ineffectiveness	0.42*	0.29	0.2	0.39*	0.39	0.4
	Perfectionism	0.18	-0.02	-0.03	0.22	0.31	0.19
	Interpersonal distrust	0.18	0.17	0.01	0.22	0.08	0.29
	Impulse regulation	0.57**	0.35	0.33	0.55**	0.49*	0.42
	Asceticism	0.56**	0.22	0.33	0.64**	0.54*	0.44
	Social insecurity	0.32	0.2	0.19	0.33	0.29	0.37

Note: Spearman's rank correlation coefficient.

Abbreviations: BMI, body mass index; EDI-2, Eating Disorder Inventory-2; WSAS, Work and Social Adjustment Scale.

* $P < 0.05$; ** $P < 0.01$ (adjusted for multiple comparisons with Benjamini-Hochberg method).

indicates that social leisure activity evokes too much emotional confusion for patients with AN to cope with.

Both impulse regulation and emotional awareness are major dimensions of Gratz and Roemer's multidimensional model.³² Lavender et al. used the model as a framework of emotional regulation in EDs.³³ Emotion regulation has recently become a topic of discussion in ED treatment. Emotion regulation, which is defined as "the ability to identify and modulate the experience and expression of emotions," has recently been identified as a potential transdiagnostic therapeutic target for patients with ED due to the increasing evidence that they have difficulty identifying and modulating emotions.^{13,34,35} Medium-to-large effect sizes were observed for the associations between maladaptive emotion regulation and EDs and eating-related symptoms, specifically the relations between lack of emotional awareness, clarity, acceptance, reappraisal, problem-solving, and EDs.³⁶ Another study examined pathological narcissism and revealed that hiding the self, which is a vulnerable narcissistic facet, significantly contributed to dysfunctional eating attitudes and behaviors over and above self-esteem for women with AN.³⁷ Furthermore, vulnerable narcissism was associated with the use of rather maladaptive emotion regulation strategies, that is, suppression.³⁸ This study indicated that emotion regulation is an important realm to improve not only for psychopathology but also for social functioning in patients with AN.

The clinical implication of this study is that emotion regulation may be important in finding a new approach for AN to improving social functioning. Harrison et al. suggested the need for treatments that involve rehabilitation of social skills.²⁰ We propose that the components for improving the ability to identify and modulate the experience and expression of emotions in the social situation should be included. We would like to seek interventions that improve emotion regulation involving modulation, awareness, understanding, and acceptance in relationships with others while understanding the vulnerable narcissistic side.

The results indicate that adult women with AN have significant social difficulties, particularly in social leisure, which are related to some AN psychopathologies, such as asceticism, impulse regulation, and interoceptive awareness. These results also support the suggestion of previous research that social anhedonia would explain interpersonal difficulties.²⁰ A future study with more participants is necessary to confirm the present results.

Limitations

This study has several limitations. First, depression or anxiety were not assessed using assessment tools although mood disorders, anxiety disorders, or other mental disorders and EDs were clinically

discriminated, therefore we could not analyze the possibility of the influence of subjective depression or anxiety. Second, the number of cases was insufficient for multiple regression analysis, thus we refrained from doing the analysis. A re-examination with sufficient numbers from each AN subtype is recommended in a future study. Third, bias was possible because the study targeted patients at a university hospital in one prefecture, and all measurements were based on self-reports. Thus, a future study with national surveys having objective social function and AN psychopathology would be useful. Fourth, the Japanese version of EDI-2 does not have sufficient internal consistency in asceticism. A re-examination using the version of EDI with high internal consistency in asceticism is recommended. Fifth, a comparison with a healthy control group is recommended to reveal the association of these results with the specific psychopathology of AN.

CONCLUSION

Japanese adult female patients with AN experience social difficulties, particularly in social leisure. Some AN psychopathologies, such as asceticism and impulse regulation, may be relevant factors. Emotion regulation may be an important treatment realm not only for psychopathology but also for social functioning in patients with AN.

AUTHOR CONTRIBUTIONS

Naoko lida designed the study. Naoko lida wrote the initial draft of the manuscript. Junko Ono and Yuki Mizuhara contributed to the data collection and critically reviewed the manuscript. Jin Narumoto contributed to the interpretation of data and critically reviewed the manuscript.

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FUNDING STATEMENT

None

CONFLICT OF INTEREST STATEMENT

Jin Narumoto is an Editorial Board member of *Psychiatry and Clinical Neurosciences Reports* and a co-author of this article. To minimize bias, Jin Narumoto was excluded from all editorial decision-making related to the acceptance of this article for publication.

DATA AVAILABILITY STATEMENT

Raw data were generated at the Department of Psychiatry, Kyoto Prefectural University of Medicine. The data supporting the findings of this study are available from the corresponding author on reasonable request.

ETHICS APPROVAL STATEMENT

Ethical approval was obtained from the Medical Ethics Review Committee of Kyoto Prefectural University of Medicine (ERB-C-2086-1).

PATIENT CONSENT STATEMENT

The medical chart was retrospectively examined. Persons who did not want samples to be used in research had the opportunity to opt out.

CLINICAL TRIAL REGISTRATION

N/A

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REFERENCES

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-5. 5th ed. Washington, DC: Amer Psuichiatric Pub Inc. 2013.
2. Wentz E, Gillberg IC, Anckarsäter H, Gillberg C, Råstam M. Adolescent-onset anorexia nervosa: 18-year outcome. *Br J Psychiatry*. 2009 Feb; 194(2):168–74. <https://doi.org/10.1192/bjp.bp.107.048686>
3. Harrison A, Tchanturia K, Naumann U, Treasure J. Social emotional functioning and cognitive styles in eating disorders. *Br J Clin Psychol*. 2012 Sep; 51(3):261–79. <https://doi.org/10.1111/j.2044-8260.2011.02026.x>
4. Nishizono-Maher A. Work and childrearing in eating disorders: a psychiatric perspective. *J JP Soc Psychosom Obset Gynecol*. 2020;24(3):284–7. (in Japanese)
5. Arcelus J, Haslam M, Farrow C, Meyer C. The role of interpersonal functioning in the maintenance of eating psychopathology: a systematic review and testable model. *Clin Psychol Rev*. 2013 Feb; 33(1):156–67. <https://doi.org/10.1016/j.cpr.2012.10.009>
6. Cardi V, Tchanturia K, Treasure J. Premorbid and illness-related social difficulties in eating disorders: an overview of the literature and treatment developments. *Curr Neuropharmacol*. 2018;16(8): 1122–30. <https://doi.org/10.2174/1570159X16666180118100028>
7. Kerr-Gaffney J, Harrison A, Tchanturia K. Cognitive and affective empathy in eating disorders: a systematic review and meta-analysis. *Front Psychiatry*. 2019 Mar 4; 10:102. <https://doi.org/10.3389/fpsy.2019.00102>
8. Tauro JL, Wearne TA, Belevski B, Filipčiková M, Francis HM. Social cognition in female adults with anorexia nervosa: a systematic review. *Neurosci Biobehav Rev*. 2022 Jan; 132:197–210. <https://doi.org/10.1016/j.neubiorev.2021.11.035>
9. Treasure J, Schmidt U. The cognitive-interpersonal maintenance model of anorexia nervosa revisited: a summary of the evidence for cognitive, socio-emotional and interpersonal predisposing and perpetuating factors. *J Eat Disord*. 2013 Apr 15; 1:13. <https://doi.org/10.1186/2050-2974-1-13>
10. Treasure J, Willmott D, Ambwani S, Cardi V, Clark Bryan D, Rowlands K, et al. Cognitive interpersonal model for anorexia nervosa revisited: the perpetuating factors that contribute to the development of the severe and enduring illness. *J Clin Med*. 2020 Feb 27; 9(3):630. <https://doi.org/10.3390/jcm9030630>
11. Oldershaw A, Lavender T, Sallis H, Stahl D, Schmidt U. Emotion generation and regulation in anorexia nervosa: a systematic review

- and meta-analysis of self-report data. *Clin Psychol Rev.* 2015 Jul; 39: 83–95. <https://doi.org/10.1016/j.cpr.2015.04.005>
12. Harrison A, O'Brien N, Lopez C, Treasure J. Sensitivity to reward and punishment in eating disorders. *Psychiatry Res.* 2010 May 15; 177(1-2):1–11. <https://doi.org/10.1016/j.psychres.2009.06.010>
 13. Harrison A, Sullivan S, Tchanturia K, Treasure J. Emotional functioning in eating disorders: attentional bias, emotion recognition and emotion regulation. *Psychol Med.* 2010 Nov; 40(11):1887–97. <https://doi.org/10.1017/S0033291710000036>
 14. Watson KK. Altered social reward and attention in anorexia nervosa. *Front Psychol.* 2010 Sep; 1:1–36. <https://doi.org/10.3389/fpsyg.2010.00036>.
 15. Christensen KA, Haynos AF. A theoretical review of interpersonal emotion regulation in eating disorders: Enhancing knowledge by bridging interpersonal and affective dysfunction. *J Eat Disord.* 2020 Jun 1; 8:21. <https://doi.org/10.1186/s40337-020-00298-0>
 16. Brockmeyer T, Holtforth MG, Bents H, Kämmerer A, Herzog W, Friederich HC. Interpersonal motives in anorexia nervosa: the fear of losing one's autonomy. *J Clin Psychol.* 2013 Mar; 69(3):278–89. <https://doi.org/10.1002/jclp.21937>
 17. Marks IM. Behavioural psychotherapy: Maudsley pocket book of clinical management. John Wright, Bristol. 1986.
 18. Mundt JC, Marks IM, Shear MK, Greist JM. The work and social adjustment scale: a simple measure of impairment in functioning. *Br J Psychiatry.* 2002 May; 180:461–4. <https://doi.org/10.1192/bjp.180.5.461>
 19. Tchanturia K, Hambrook D, Curtis H, Jones T, Lounes N, Fenn K, et al. Work and social adjustment in patients with anorexia nervosa. *Compr Psychiatry.* 2013 Jan; 54(1):41–5. <https://doi.org/10.1016/j.comppsy.2012.03.014>
 20. Harrison A, Mountford VA, Tchanturia K. Social anhedonia and work and social functioning in the acute and recovered phases of eating disorders. *Psychiatry Res.* 2014 Aug 15; 218(1-2):187–94. <https://doi.org/10.1016/j.psychres.2014.04.007>
 21. Turner H, Bryant-Waugh R, Peveler R. The clinical features of EDNOS: relationship to mood, health status and general functioning. *Eat Behav.* 2010 Apr; 11(2):127–30. <https://doi.org/10.1016/j.eatbeh.2009.10.006>
 22. Hokkaido Intellect Tank. Survey on the result analysis in the model project to support the promotion of self-reliance for the Needy. 2014. March (Japanese). Accessed October 6, 2023. <https://www.hit-north.or.jp/report/2014/05/08/799/>
 23. Garner DM, Olmstead MP, Polivy J. Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *Int J Eat Disord.* 1983;2(2):15–34.
 24. Garner DM. Eating disorder inventory-2: Professional manual. Odessa, FL: Psychological Assessment Resources; 1991.
 25. Tachikawa H, Yamaguchi N, Hatanaka K, Kobayashi J, Sato S, Mizukami K, et al. The Eating Disorder Inventory-2 in Japanese clinical and non-clinical samples: psychometric properties and cross-cultural implications. *Eat Weight Disord.* 2004 Jun; 9(2):107–13. <https://doi.org/10.1007/BF03325053>
 26. Tachi T, Kusano-Schwarz M, Murakami K, Kobayashi Y, Miyake Y. Usefulness of the Eating Disorder Inventory-2 Japanese version in patients with eating disorders. *Tokai J Exp Clin Med.* 2007 Sep 20; 32(3):78–82.
 27. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J R Stat Soc B.* 1995;57(1):289–300.
 28. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillside, NJ: Lawrence Erlbaum Associates; 1988. <https://doi.org/10.4324/9780203771587>
 29. Garner DM. Eating disorder inventory-3 (EDI-3) Professional Manual. Lutz, FL: Psychological Assessment Resources; 2004.
 30. Corstorphine E, Mountford V, Tomlinson S, Waller G, Meyer C. Distress tolerance in the eating disorders. *Eat Behav.* 2007 Jan; 8(1): 91–7. <https://doi.org/10.1016/j.eatbeh.2006.02.003>
 31. Harrison A, Genders R, Davies H, Treasure J, Tchanturia K. Experimental measurement of the regulation of anger and aggression in women with anorexia nervosa. *Clin Psychol Psychother.* 2011 Nov-Dec; 18(6):445–52. <https://doi.org/10.1002/cpp.726>
 32. Gratz KL, Roemer L. Multidimensional assessment of emotion regulation and dysregulation: development, factor structure, and initial validation of the difficulties in emotion regulation scale. *J Psychopathol Behav Assess.* 2004;26(1):41–54. <https://doi.org/10.1023/B:JOBA.0000007455.08539.94>
 33. Lavender JM, Wonderlich SA, Engel SG, Gordon KH, Kaye WH, Mitchell JE. Dimensions of emotion dysregulation in anorexia nervosa and bulimia nervosa: a conceptual review of the empirical literature. *Clin Psychol Rev.* 2015 Aug; 40:111–22. <https://doi.org/10.1016/j.cpr.2015.05.010>
 34. Mallorquí-Bagué N, Vintró-Alcaraz C, Sánchez I, Riesco N, Agüera Z, Granero R, et al. Emotion regulation as a transdiagnostic feature among eating disorders: Cross-sectional and longitudinal approach. *Eur Eat Disord Rev.* 2018 Jan; 26(1):53–61. <https://doi.org/10.1002/erv.2570>
 35. Meneguzzo P, Garolla A, Bonello E, Todisco P. Alexithymia, dissociation and emotional regulation in eating disorders: evidence of improvement through specialized inpatient treatment. *Clin Psychol Psychother.* 2022 Mar; 29(2):718–24. <https://doi.org/10.1002/cpp.2665>
 36. Prefit AB, Căndea DM, Szentagotai-Tătar A. Emotion regulation across eating pathology: a meta-analysis. *Appetite.* 2019 Dec 1; 143:104438. <https://doi.org/10.1016/j.appet.2019.104438>
 37. Boucher K, Côté M, Gagnon-Girouard MP, Ratté C, Bégin C. Eating pathology among patients with anorexia nervosa and bulimia nervosa: the role of narcissism and self-esteem. *J Nerv Ment Dis.* 2018 Oct; 206(10):776–82. <https://doi.org/10.1097/NMD.0000000000000890>
 38. Loeffler LAK, Huebben AK, Radke S, Habel U, Derntl B. The association between vulnerable/grandiose narcissism and emotion regulation. *Front Psychol.* 2020 Oct 15; 11:519330. <https://doi.org/10.3389/fpsyg.2020.519330>

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