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RESEARCH ARTICLE

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Social communication and restricted, repetitive behavior as assessed with a diagnostic tool for autism (ADOS-2) in women with anorexia nervosa

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Abstract

Objective: In anorexia nervosa (AN), the traits of autism spectrum disorder (ASD) are associated with poor outcomes. However, the subtle nature of these characteristics remains poorly understood. We investigated the in-depth patterns of ASD traits using Autism Diagnostic Observation Schedule-Second Edition (ADOS-2) in women with AN.

Methods: Of 28 women with ICD-10 AN, 16 (age 19–30 years) participated in the ADOS-2, a video-recorded, semistructured diagnostic assessment for social communication and interaction and restricted, repetitive behaviors and interests related to ASD. None of the participants had previously been diagnosed with ASD. Other measurements included the Eating Disorder Examination Questionnaire and the Wechsler Abbreviated Scale of Intelligence-IV.

Results: Five individuals (18% of all, 31% of those assessed) scored above the cutoff for autism in ADOS-2. They had challenges in social communication and interaction, manifesting as sustained difficulties in social relationships and deficits in conversation skills. Few described being frequently misunderstood by others, including in the eating

disorder treatment settings. Three individuals showed prominent restricted and repetitive behaviors such as ritual seeking, eating-related routines, sensory sensitivity related to food texture and selective eating, and intense interest in specific topics. The mean duration of AN in women above the cutoff was twice as long compared with those below (12.3 vs. 6.2 years).

Discussion: The ASD-related characteristics and behavior appear to contribute to the manifestation and duration of AN in a subgroup of women. Among these women, the traits of ASD appear to be mixed with eating disorder symptoms, which should be taken into account in the treatment.

KEYWORDS

anorexia nervosa, autism, autism spectrum disorders, eating disorders, feeding and eating disorders

1 | INTRODUCTION

Elevated traits of autism spectrum disorder (ASD) and diagnosed ASD are overrepresented among individuals with anorexia nervosa (AN) (Boltri & Sapuppo, 2021; Huke et al., 2013). Clinical pictures of these two disorders share some overlapping features. Restrictive eating, a core symptom of AN, is highly prevalent in individuals with ASD (Rodrigues et al., 2023; Spek et al., 2020); core symptoms of ASD, deficits in social cognition and rigid cognitive and behavioral functioning, are common among individuals with AN (Tauro et al., 2022; Westwood et al., 2016). Co-occurrence of diagnosed ASD and AN is reported to be 1.3%–4.2% in register-based studies (Dinkler et al., 2021; Koch et al., 2015; Zhang et al., 2022). In contrast, studies that have actively screened for ASD among women with diagnosed AN have reported significantly higher comorbidity prevalence of up to 30% (Boltri & Sapuppo, 2021; Huke et al., 2013).

A slightly different presentation of ASD in females compared with males (Saure et al., 2023) may lead to a situation where a girl/woman, despite having prominent and clinically significant traits of autism, does not meet the orthodox diagnostic criteria of ASD. This applies especially to cognitively able girls and women (i.e., women with ASD without intellectual disability) and may result in a lack of or late diagnosis (Haney, 2016; Saure et al., 2023; Zhang et al., 2022). ASD-like difficulties in social communication and interaction as well as cognitive rigidity have been suggested to predispose to AN and contribute to its severity and increased duration (Saure et al., 2020; Zhang et al., 2022). Difficulties in social communication and interaction may predispose to social exclusion and poor overall social functioning. These may manifest as conflicts in friendships, loneliness, limited social networks, low self-confidence, social anxiety, and becoming a victim of bullying—which increase the risk of developing AN (Cardi, Mallorqui-Bague, et al., 2018; Cardi, Tchanturia, et al., 2018; Krug et al., 2013). Restricted and repetitive behaviors and interests, another symptom dimension of ASD, manifest as repetitive behavior, inflexibility, and cognitive rigidity and may underlie many characteristics of AN such as rituals and routines around eating and obsessive and detail-oriented behavior toward weight, exercising, and body checking (Bitsika & Sharpley, 2018; King et al., 2019). Dimension of restricted and repetitive behaviors and interests also includes hyper- or hyporeactivity to sensory

input or unusual sensory aspects of the environment (American Psychiatric Association, 2013); this involves sensations arising within the body (e.g., sensing body boundaries) that might contribute to the distorted body image in AN (Gaudio et al., 2014).

We are aware of five studies reporting the quantitative or qualitative patterns of the Autism Diagnostic Observation Schedule-Second Edition (ADOS-2) in individuals with AN. ADOS-2 is a semistructured diagnostic instrument for evaluating ASD, designed based on the observations of trained clinicians (Lord et al., 2012). Two studies reported the quantitative patterns of ADOS-2 items on individuals with AN but did not separately analyze individuals who scored below and above the ASD cutoff (Bentz et al., 2020; Kerr-Gaffney et al., 2021). Three studies reported the qualitative results of ADOS-2 among participants with AN who met the diagnostic criteria of ASD or had high ASD traits (Doris et al., 2014; Mandy & Tchanturia, 2015; Westwood et al., 2018). One of these reported friendship experiences based on an Autism Diagnostic Observation Schedule – Generic (ADOS-G) interview among seven women with AN and potential ASD (Doris et al., 2014). In this study, women with AN and potential ASD had widespread challenges in friendships, which had preceded the onset of their AN (Doris et al., 2014). Two other studies included short qualitative descriptions of all ADOS-2 subscales (Mandy & Tchanturia, 2015; Westwood et al., 2018). The first one included 10 women with AN and potential ASD, of whom five had scores above the ASD cutoff in ADOS-2, and an additional two women were judged to have ASD based on the developmental interview (Mandy & Tchanturia, 2015). The second study included 40 adolescent females of whom 21 scored above the ASD cutoff. Of them, only four were judged to exceed the diagnostic threshold of ASD when the assessment also included a developmental interview (Westwood et al., 2018). Both of these studies included brief qualitative descriptions of findings in the ADOS-2 among those who scored above the cutoff; participants were reported having challenged social communication and interaction, such as unusual eye contact, impaired conversation skills, the limited use of gestures, and lack of insight into conventional relationships (Mandy & Tchanturia, 2015; Westwood et al., 2018). Some participants also manifested restricted and repetitive behavior, such as inflexibility and sensory abnormality (Mandy & Tchanturia, 2015; Westwood et al., 2018).

To summarize, previous studies suggest that a subset of women with AN have wide-ranging challenges in social communication and interaction, as well as pronounced restricted and repetitive behaviors and interests. Increased insight into the nature of these characteristics could improve the understanding of the overall clinical picture among these individuals, which may further advance planning the treatment adaptations for those with both AN and ASD. We therefore aimed to explore the quantitative and qualitative patterns of social communication and interaction and restricted and repetitive behaviors and interests as assessed in ADOS-2 among women with AN who scored above versus below the cutoff for ASD.

2 | METHODS

2.1 | Participants and setting

Participants with AN were recruited via The Eating Disorder Association of Finland and the Eating Disorder Unit of Turku University Hospital. Participants were informed about recruitment via the mailing list and website of the Eating Disorder Association of Finland. Patients in the Eating Disorder Unit of Turku University Hospital who fulfilled the inclusion criteria were informed about the possibility of participating in the study via personnel. Both inpatients and outpatients were included. All individuals with AN had been diagnosed by specialists and fulfilled the ICD-10 diagnostic criteria of AN (F50.0), indicating that they also fulfilled the diagnostic criteria of AN in DSM-5. Exclusion criteria included a history of psychosis, head trauma with unconsciousness, substance abuse, a neurodevelopmental disorder including ASD, a neurological disorder, learning disability, or Full-Scale Intelligence Quotient (FSIQ), Verbal Comprehension Index (VCI), or Perceptual Reasoning Index (PRI) under 70. Ethical permission for the study was obtained from the Ethics Committee of the Hospital District of Helsinki and Uusimaa

(HUS/1886/2017 and HUS/161/2019). The women participated voluntarily after they were provided informed written consent for the study.

The current research is part of a project focusing on the neuropsychological characteristics of AN. Study participants included individuals with AN (n = 42) and healthy controls (n = 40) (Saure, Lepistö-Paisley, et al., 2022; Saure, Raevuori, et al., 2022). Results concerning emotion recognition and regulation, alexithymia, empathy abilities, and sensory processing have been reported elsewhere (Saure, Lepistö-Paisley, et al., 2022; Saure, Raevuori, et al., 2022). Of participants with AN, 28 fulfilled diagnostic criteria for AN (F50.0), while 14 had a diagnosis of atypical AN (F50.1), implying that they missed some characteristics of F50.0 AN but that their overall clinical picture matched that of AN. Those with ICD-10 F50.0 AN (n = 28) were invited to participate in the additional assessment including ADOS-2, and 16 of them agreed. After the assessment, participants got feedback on their ADOS-2 findings. The most commonly reported cause for declining participation was video recording, including in the ADOS-2 protocol.

Assessments included two distinct appointments for each woman who participated in ADOS-2. Questionnaires were filled out before the appointments. Neuropsychological tests reported elsewhere (Saure, Raevuori, et al., 2022) and the Wechsler Abbreviated Scale of Intelligence-IV (WASI-IV) were conducted during the first appointment (lasting 1.5–2 h). Women who participated in the ADOS-2 were invited to the second appointment. The duration of ADOS-2 was between 45 and 60 min.

2.2 | Measures

2.2.1 | ADOS-2

The ADOS-2 is a reliable and valid semistructured diagnostic assessment designed to assess social communication and interaction as well as restricted and repetitive behaviors and interests related to ASD (Lord et al., 2012). In the present study, all participants performed Module 4, which was designed for verbally fluent adults. Module 4 consists of five subscales: social communication (10 items), social interaction (13 items), imagination (1 item), restricted and repetitive behaviors and interests (5 items), and other behavior (3 items). The items with the highest sensitivity and specificity for recognizing autism were selected for the diagnostic algorithm (Lord et al., 2012). In module 4, the diagnostic algorithm comprises 11 items forming an algorithm scale representing social affect. Items included in the restricted and repetitive behaviors and interests subscale are not included in the diagnostic algorithm in module 4, and because of this, we utilized the revised ADOS-2 algorithm based on the module 3 algorithm (Hus & Lord, 2014; Sedgewick et al., 2019). The revised algorithm includes social affect and restricted and repetitive behaviors and interests subscales. It has also been suggested that it has higher specificity and sensitivity compared with the old algorithm consisting of only social affect subscale (Hus & Lord, 2014). The revised diagnostic algorithm consists of 14 items forming social affect and restricted and repetitive behaviors and interests subscales. All ADOS-2 assessments were video-recorded for scoring. ADOS-2 was performed by two trained, research-reliable clinical psychologists. Each participant completed ADOS-2 with E. S. who scored all the assessments. To ascertain the scoring, S. H. rescored four (25%) of the ADOS-2 video-recorded assessments. Inter-rater reliability was 88.3%.

2.2.2 | WASI-IV

Cognitive ability was assessed using WASI-IV. WASI-IV consists of the following subtests: vocabulary, similarities, block design, and matrix reasoning. It produces verbal, performance, and full-scale intelligence quotient scores (VCI,

PRI, FSIQ) (Wechsler, 1999). We formed these quotients based on the Wechsler Adult Intelligence Scale-IV (WAIS-IV) (Wechsler, 2008), as no official Finnish edition of the WASI-IV exists.

2.2.3 | Eating Disorder Examination Questionnaire (EDE-Q)

A self-report questionnaire measured eating disorder symptoms, including restraint, eating concerns, shape concerns, and weight concerns (Isomaa et al., 2016). A higher score indicates increased eating disorder symptoms. The range of the scale is 0–132.

2.2.4 | Background information

The self-report questionnaire covered birth date, years of education, date of AN onset, comorbid psychiatric diagnoses, psychopharmacological medication, binge–purge symptoms, weight, and height. Body mass index (BMI) was calculated using self-reported values (weight, height).

2.3 | Data analysis

Participants who scored above the revised cutoff for autism in ADOS-2 scores comprised one group, and those who scored below the cutoff comprised another group. The Statistical Package for the Social Sciences (SPSS), version 28.0 (SPSS 28.0. IBM Corp, 2021), was used to analyze the quantitative data. The distribution of variables was assessed with histograms and Shapiro–Wilk tests. Independent samples *t* test was used to calculate differences for those variables that were normally distributed and continuous (FSIQ, VCI, PRI, BMI, duration of AN, ADOS-2 algorithm). Mann–Whitney *U* test was used for calculating group differences in the other variables (age, education, EDE-Q, ADOS-2 subscales, and items). The χ^2 test was used to calculate group differences in dichotomous variables (type of AN, i.e., restrictive or binge–purge, psychopharmacological medication, comorbid psychiatric conditions). The association between ADOS-2 algorithm scores and eating disorder severity was investigated with Pearson correlations between normally distributed variables (ADOS-2 algorithm scores, BMI, duration of AN) and Spearman correlations between ADOS-2 and EDE-Q since scores of EDE-Q were not normally distributed. The BMI information was missing in one participant. Missing information was not replaced, and thus, the participant whose data were missing was not included in the analysis including BMI.

The qualitative description of findings in the ADOS-2 was based on the observations of two trained research-reliable clinical psychologists (E. S. and S. H.). The description included patterns in social communication, social interaction, and restricted and repetitive behaviors and interests among participants who scored above the autism cutoff. For reasons of confidentiality, certain identifying details were altered (pseudonymized) or omitted.

3 | RESULTS

3.1 | General

See Table 1 for participants characteristics. Participants' mean age was 25.42 (SD 3.94, range 19–30 years). Regarding comorbid conditions, among those who scored above the cutoff, one reported having depression. Among those who scored below the cutoff, five participants reported having depression, one reported having an anxiety disorder, and one reported having both anxiety disorder and depression. Women who scored above the

TABLE 1 Characteristics of participants with scores above and below the autism cut-off in Autism Diagnostic Observation Schedule-Second Edition (ADOS-2).

		Participants (n = 5) with scores above the autism cut-off	Participants (n = 11) with scores below the autism cut-off
Age in years mean (SD)		25.66 (3.35)	25.31 (4.32)
Education in years mean (SD)		15.20 (3.42)	14.91 (2.59)
Full-Scale Intelligence Quotient mean (SD)		105.00 (23.18)	110.18 (18.06)
Perceptual Reasoning Index (PRI) mean (SD)		99.80 (22.61)	105.00 (19.105)
Verbal Comprehension Index (VCI) mean (SD)		108.80 (17.36)	111.82 (11.61)
Duration of AN mean (SD)		12.30 (3.56)***	6.19 (1.93)
Body mass index mean (SD)		16.19 (1.19)	15.41 (2.88)
Eating Disorder symptoms total (EDE-Q) mean (SD)		74.60 (44.03)	81.55 (36.45)
Psychopharmacological medication, n (%)	Medication	3 (60%)	2 (18%)
	No medication	2 (40%)	9 (82%)
Comorbid psychiatric conditions, n (%)	One or more comorbid conditions	1 (20%)	7 (64%)
	No comorbid conditions	4 (80%)	4 (36%)
Type of AN: anorexia nervosa-restrictive (AN-R) or anorexia nervosa-binge-purge (AN-BP), n (%)	AN-R	4 (80%)	6 (55%)
	AN-BP	1 (20%)	5 (45%)

Note: The significant between-group difference is marked with the following symbol: ***$p < 0.001$.

autism cutoff in ADOS-2 had a significantly longer duration of AN compared with those who scored below the cutoff in ADOS-2 (mean duration of AN 12.30 vs. 6.19 years [$t(14) = 1.661$, $p < 0.001$, Cohen's $d = 2.505$]). ADOS-2 algorithm scores correlated significantly with the duration of AN ($r = 0.582$, $p = 0.018$). The correlation between ADOS-2 and BMI was not significant ($r = 0.257$), nor was the correlation between ADOS-2 and EDE-Q scores ($r_s = 0.182$).

3.2 | ADOS-2 classification of autism and ASD

Of the whole sample of women with ICD-10 AN invited to participate in the ADOS-2 assessment (n = 28), 17.8% scored above the autism cutoff according to both the original and revised algorithm. Focusing on women who participated in ADOS-2, five out of 16 (31.3%) scored above the autism cutoff according to both original and revised algorithms. One individual scored above the ASD cutoff but below the autism cutoff according to the original ADOS-2 algorithm and below both cutoffs according to the revised algorithm. The revised algorithm has been suggested to have higher specificity and sensitivity compared with the original algorithm (Hus & Lord, 2014; Sedgewick et al., 2019). It has also been shown to be more suitable for women with AN compared with the old algorithm (Hus & Lord, 2014; Sedgewick et al., 2019). We, therefore, decided to follow the classification of the revised algorithm in follow-up analyses.

TABLE 2 The results of Autism Diagnostic Observation Schedule-Second Edition (ADOS-2) algorithm and subscales are presented in the table.

	Participants (n = 5) with scores above the autism cut-off, means (SD)	Participants (n = 11) with scores below the autism cut-off, means (SD)	Test statistics
Revised diagnostic algorithm	12.20 (3.42)***	3.00 (1.90)	U = 55.00 Cohen's d = 2.484
ADOS-2 subscale: Social communication	4.40 (0.55)***	1.55 (1.21)	U = 55.00 Cohen's d = 2.484
ADOS-2 subscale: Social interaction	7.40 (1.67)***	1.55 (1.44)	U = 55.00 Cohen's d = 2.484
ADOS-2 subscale: Imagination	0.60 (0.89)	0.36 (0.51)	U = 30.50 Cohen's d = 0.171
ADOS-2 subscale: Restricted and repetitive behaviors and interests	3.00 (2.35)	0.82 (0.60)	U = 41.00 Cohen's d = 0.828
ADOS-2 subscale: Other behavior	0.60 (0.55)	0.09 (0.30)	U = 41.50 Cohen's d = 0.864

Note: Means are presented instead of medians as they better describe the data. The significant between-group differences are marked with the following symbol: ***p < 0.001.

Scores of the ADOS-2 algorithm and subscales are presented in Table 2. Detailed patterns of ADOS-2 are presented in Figure 1. See also Supporting Information: Table 1 for scores of individual ADOS-2 items The follow-up analyses revealed that individuals who scored above the cutoff for autism had significantly higher scores in the following items compared with individuals who scored below the cutoff: conversation (U = 52.00, p = 0.003, Cohen's d = 1.927), facial expression directed to others (U = 49.00, p = 0.013, Cohen's d = 1.535), shared enjoyment in interaction (U = 49.50, p = 0.009, Cohen's d = 1.593), quality of social overtures (U = 53.50, p < 0.001, Cohen's d = 2.177), quality of social responses (U = 47.50, p = 0.019, Cohen's d = 1.375), and overall quality of rapport (U = 49.50, p = 0.09, Cohen's d = 1.593) (Figure 1).

3.3 | Qualitative description of the assessment among participants above the ADOS-2 cutoff for autism

3.3.1 | Social communication

Three out of five participants with ADOS-2 scores above the autism cutoff presented some speech abnormalities. Two women had markedly flat speech tone and one exhibited atypical intonation. Two were assessed to have a formal and pedant style of speech and they used stereotyped phrases and repetitive expressions in standard language. They also had a highly exact and detail-oriented communication style. Two individuals offered spontaneously only very limited information about their own experiences. All five women were deemed to have major challenges in holding back-and-forth conversations. They tended to follow their own strain of thought rather than engage in reciprocal conversation. Four women used only limited gestures in the test situation. Three individuals did not have gestures signaling emotional meanings or empathic gestures. One individual in turn had gestures that were either inconsistent with the conversation or were considered exaggerated.

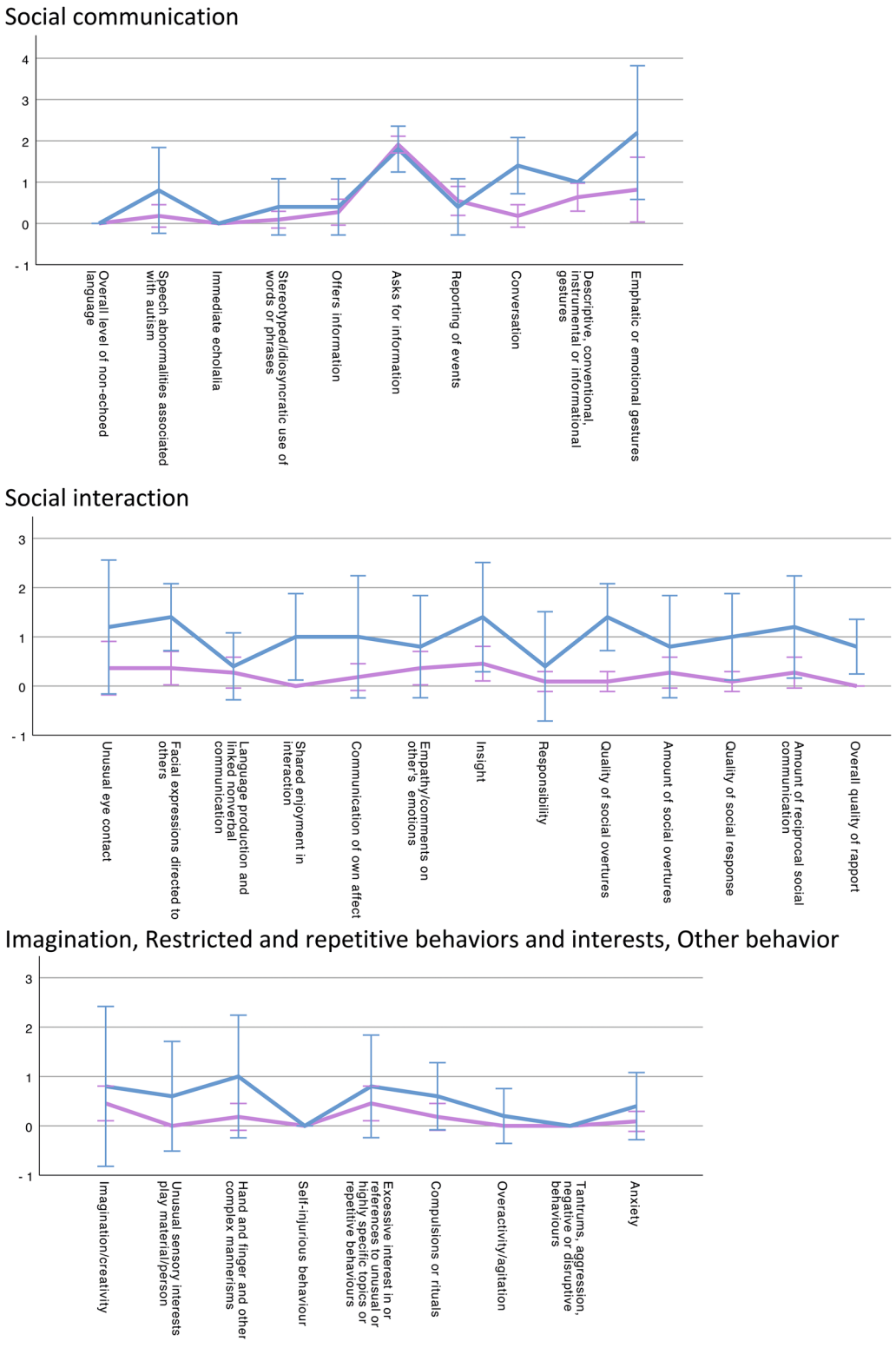

FIGURE 1 (See caption on next page).

3.3.2 | Social interaction

Three participants had eye contact that was deemed atypical; they avoided eye contact, fell into "blank stare mode," or were not able to modulate social interaction with gaze direction. All five participants directed very few facial expressions at the researcher. All five participants appeared to have challenged social relationships. Three had had difficulties developing and maintaining friendships while one presented an absence of interest in peers. All participants described having only a few friends, and two reported that they preferred and enjoyed being alone rather than spending time with friends. Two reported increased experience of stress if they had to spend time with other people. Two described that they did not value friendship in itself, and rather wished to make friends with people who share common interests with them. They reported that they do not often see friends, with frequency varying between one or two times a month and a few times a year. Two women described that dating anyone would be a struggle because they were not able to see anyone as often as it would require and that their everyday rituals and habits related to eating would be disturbed. Participants also described their experiences of being misunderstood by other people. In the context of eating disorder treatment, this had happened with professionals, in group therapy situations, and in casual contact with other patients. They had also noticed having said something unpolite even if they had not intended it in that way. Two described that them being highly honest tended to evoke irritation among other people. Women also recalled major social challenges at school, including having been bullied by peers. Two of them also mentioned that bullying had contributed to the development of their eating disorder. Two women described that they had learned to camouflage their social shortcomings. They reported that they had been taught how to interact with people, for example, their parents had taught them social norms and context-appropriate behavior, or that they had learned by heart how people usually interact with each other and how they are expected to respond to camouflage their challenges. Two women also described having noticed that their social interaction style and social needs differed from the conventional expectations in society. One participant reported being aware of the social standard which presumes that people like seeing each other, and that this causes distress for her. Three participants reported that their challenges in social interaction manifested in multiple ways already in childhood and thus predated the onset of AN.

Regarding the quality and quantity of social interaction, all five participants exhibited the atypically deemed quality of social overtures, and four also exhibited atypical social responses in the assessment. Two participants made social overtures solely based on their own interests and the other three participants made qualitatively incomplete or inappropriately considered social overtures, for example, overtures unsuitable for the context or complete lack of eye contact when making social overtures. Regarding social responses, one participant reacted repeatedly in an exactly similar manner, lacking normally considered variability in reaction styles. One woman repeatedly answered very briefly, and two often ignored the researcher's comments but instead kept going about the topic of which they had spoken before the comment. Four participants were deemed to have a limited amount of reciprocal communication. Two of them only answered the questions presented by the researcher but did not participate in maintaining the conversation; another two spoke abundantly, but the communication was not considered reciprocal.

FIGURE 1 Patterns of Autism Diagnostic Observation Schedule-Second Edition (ADOS-2). The blue (upper) line illustrates the mean scores and error bars (95% confidence intervals) of those who scored above the autism cutoff in the ADOS-2 algorithm. The violet (lower) line illustrates the mean scores and error bars (95% confidence intervals) of those who scored below the cutoff in the ADOS-2 algorithm.

3.3.3 | Restricted and repetitive behaviors and interests

There was large variability in restricted and repetitive behaviors and interests among individuals who scored above the autism cutoff. Three of five had high total scores in the subscale; one exhibited only a finger mannerism, and one did not exhibit restricted and repetitive behaviors and interests. Two women with high scores in this subscale exhibited atypical sensory processing in the test situation; for instance, they palpated the texture of materials (e.g., tabletop and chair cover) and exhibited prolonged visual contemplation of objects. These two also reported that they got easily distracted by noises in their daily life. One woman described selective sound hypersensitivity, including, for instance, other people's eating sounds. One woman reported avoiding some foods based on their texture, and another reported a general dislike of the smell of food. Three women reported selective eating based on the sensory aspects of food. Two women exhibited some hand and finger mannerisms considered typical of ASD. Three women had an intense interest in the specific topics of which they had extensive and detailed knowledge, for example, related to human sciences and nature. They spoke abundantly about these themes during the assessment. Two of them also reported that certain universal themes, such as equality, equity, and climate change, were very important to them, and that they would get frustrated if other people appeared to lack understanding of the importance of these topics. The two women also described having an extensive collection of things related to their specific interests. Two women studied a university degree related to their specific interests. These participants also exhibited various rituals in test situations; for example, they listed things, mentioned exact numeric values (e.g., exact dates), and asked for detailed corrections of the instructions. Three women also reported having strict routines that they follow daily. Some of these routines were related to eating and food (e.g., overly exact mealtimes and organizing food items based on their color and energy content).

4 | DISCUSSION

We aimed to explore the patterns of ASD as manifested in ADOS-2 assessment in women with AN who scored above versus below the cutoff for autism. Five participants with scores above the cut-off represented 31% of those who chose to participate in the video-recorded ADOS-2 assessment; of the total sample invited, the proportion of those above the autism cut-off was 18%. Women above the cutoff presented wide-ranging difficulties in social communication and interaction, including impaired conversation skills, limited facial expression directed to others, lack of shared enjoyment in the interaction, the atypical quality of social overtures and responses, and unusual overall quality of rapport. All five participants also presented lasting challenges in social relationships, such as being misunderstood by others; this preceded their eating disorder and compromised its treatment. Three women showed restricted and repetitive behaviors and interests manifesting as highly restrictive interests, need for routines, and ritual seeking including routines in eating behavior. They exhibit sensory sensitivity, manifesting, for instance, as selective eating based on food textures. Women with scores above the autism cutoff had twice the length of the mean duration of AN compared with those with scores below the cutoff (12.3 vs. 6.2 years) and higher ASD traits also correlated with the longer duration of AN.

Our findings about the nature of difficulties in social communication and interaction and restricted and repetitive behaviors and interests are supported by previous studies investigating ASD with ADOS-2 in women with AN (Doris et al., 2014; Mandy & Tchanturia, 2015; Westwood et al., 2018). In line with the previous evidence of the role of social difficulties as a risk factor for developing AN (Cardi, Mallorqui-Bague, et al., 2018; Krug et al., 2013), our participants described having lasting conflicts in friendships that preceded the onset of AN. Some of our participants also described that they had learned to camouflage and mask their ASD symptoms, as reported to be typical among females with ASD (Allely, 2019). Furthermore, restricted and repetitive behaviors and interests observed in our participants were related to living beings (e.g., animals, nature, human science), also typical for the female phenotype of ASD (Duvekot et al., 2017). As for males with ASD, restricted and repetitive behaviors and

interests are typically stereotyped and focus on mechanical themes (Duvekot et al., 2017). In summary, our participants exhibited many features typical of a female phenotype of ASD. Thus, our results are also in line with previous studies investigating ASD in girls and women (Bargiela et al., 2016; Milner et al., 2019).

The assessment of ASD in cognitively able females is complicated since the presentation of ASD differs from that in males, and the diagnostic criteria for ASD and related screening instruments have been developed predominantly for the male symptom characteristics (Haney, 2016; Saure et al., 2023). In line, studies suggest that a marked number of individuals with AN may have undiagnosed ASD (Bentz et al., 2020; Boltri & Sapuppo, 2021; Dinkler et al., 2021; Huke et al., 2013; Zhang et al., 2022). We also found that more than one-sixth (18%) to almost one-third (31%) of our study participants scored above the autism cutoff in ADOS-2, even though none of them had been diagnosed with ASD. Girls and women with ASD have been reported going undiagnosed despite previous contacts in healthcare, and in line, females with AN and ASD do not generally have ASD diagnoses before AN treatment (Bargiela et al., 2016). A recent population-based study in Sweden showed that a substantial majority (86%) of individuals with both AN and ASD received ASD diagnosis after AN diagnosis (Zhang et al., 2022). In line, in individuals with AN and comorbid ASD, the median age of ASD diagnosis was 23 years, suggesting a delayed ASD diagnosis in this population (Zhang et al., 2022). Late-diagnosed women with ASD (both with and without comorbid AN) have been described to report that receiving an ASD diagnosis was eventually helpful and increased their self-understanding (Bargiela et al., 2016; Brede et al., 2020).

Evidence consistently suggests that co-occurring ASD characteristics are associated with enduring AN (Babb et al., 2022; Nazar et al., 2018; Nielsen et al., 2015; Saure et al., 2020; Stewart et al., 2017; Zhang et al., 2022). ASD traits appear to motivate ED behaviors in ways that are not accounted for in traditional models of AN (e.g., body image issues) (Babb et al., 2021; Brede et al., 2020). Late or missed ASD diagnosis may be an important risk factor for developing and contributing to the severity of any mental disorders, including AN, since without adequate diagnosis, many services and support are inaccessible (Green et al., 2019). It has also been proposed that elevated ASD traits are the consequence of acute eating disorder-related processes, such as starvation. However, we found no association between (higher) ASD traits and (lower) BMI. Our results are in line with previous studies suggesting that starvation is not associated with ASD traits (Kerr-Gaffney et al., 2020; Nazar et al., 2018; Nielsen et al., 2015; Råstam et al., 2003). In addition, elevated ASD traits manifest among non-affected relatives of individuals with AN, suggesting that characteristics of ASD in individuals with AN are not state-related but rather a trait with a genetic component (Holliday et al., 2005; Roberts et al., 2010; Tapajóz et al., 2019; Tenconi et al., 2010).

Individuals with AN and ASD features may be less likely to benefit from standard AN treatment (Babb et al., 2022; Saure, Ålgars, et al., 2022; Zhang et al., 2022). For example, difficulties in social communication may cause misunderstandings in therapeutic relationships. Further, rigidity and inability to make changes may be understood as resistance and disengaging to treatment (Babb et al., 2021, 2022; Kinnaird et al., 2019). More than individuals with AN and low ASD traits, those with AN and ASD may avoid certain foods due to their sensory aspects (e.g., texture, temperature, smell). This may cause struggles in treatment if not comprehended that refusal to eat certain foods is based on atypical sensory processing rather than conventionally assumed grounds in AN (e.g., the energy content of food) (Brand-Gothelf et al., 2016; Saure, Lepistö-Paisley, et al., 2022). Among these individuals, ASD features, such as rigidity and sensory issues, also described by our participants, have been suggested as underlying AN symptoms. Some individuals with AN and ASD or high ASD traits may also exhibit features of avoidant/restrictive food intake disorder (ARFID), which have high comorbidity with ASD (Koomar et al., 2021). ARFID is not associated with body image issues but rather a food restriction driven by atypical sensory processing (American Psychiatric Association, 2013). The underlying characteristics and treatment methods for ARFID differ somewhat from those for AN, and if some individuals with AN and ASD also have ARFID features, the traditional treatment for AN may be ineffective for them (Thomas & Eddy, 2019). These individuals may benefit from treatment modification, such as taking into account their sensory needs and applying individual modifications for psychological treatments. In some instances, it may be a reasonable approach to accept ASD-related behavior,

such as demand for routines or selective eating based on sensory aversions (Saure et al., 2021). In the future, it is crucially important to develop treatments for individuals with AN and ASD.

5 | LIMITATIONS

We obtained ADOS-2 information only from 57% of the participants with AN who were invited to the assessment resulting in a limited sample size. Thus, a sample may be biased toward increased characteristics of ASD. The duration of AN was calculated based on self-reported information about the onset date of AN, so reporting bias may occur. We used only observational measures for evaluating ASD traits. The assessment of developmental history, such as caregiver interview (e.g., Autism Diagnostic Interview-Revised, ADI-R) would have been important for ascertaining the ASD diagnosis. ADOS-2 assessment has been reported to produce false negative results, specifically among cognitively able girls and women (Haney, 2016; Mandy & Tchanturia, 2015). On the other hand, although ADOS-2 shows high sensitivity for detecting ASD symptoms, it has been shown that among individuals with complex comorbid psychiatric presentations, particularly those with psychosis, it may overidentify individuals having ASD; this suggests high false positive rate and lower specificity (Greene et al., 2022). However, since ADOS-2 is validated and was performed by trained clinicians, it therefore offers valuable information on participants' capability in social communication and interaction. That notion was supported in our study; even in a small sample, the difference in ADOS-2 scores between above and below cutoff groups was large (Saure et al., 2023).

6 | CONCLUSION

Using semistructured diagnostic assessment for ASD, we found that between one-sixth to one-third of women with AN scored above the cut-off for autism. These women exhibited widespread and lasting challenges in social communication and interaction and restricted and repetitive behaviors and interests such as routine seeking, restrictive interests, and atypical sensory processing, which were intertwined with their eating disorder symptoms. The ASD-related characteristics and behaviors may contribute to the manifestation and duration of AN in a subgroup of individuals and should be considered the treatment.

AUTHOR CONTRIBUTIONS

All authors contributed to the study's conception and design. Emma Saure contributed to the conceptualization, conducting research, data analysis, and drafting the original manuscript with Anu Raevuori. Sini Hämäläinen contributed to the ascertainment scoring of ADOS-2 videos and the manuscript's editing and revision. Anu Raevuori, Marja Laasonen, Anneli Kylliäinen, and Tuulia Lepistö-Paisley contributed to the conceptualization and manuscript's editing and revision. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy. Requests to access the data sets should be directed to emma.saure@helsinki.fi.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by The Ethics Committee of Helsinki Uusimaa Hospital District. The patients/participants provided their written informed consent to participate in this study.

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PEER REVIEW

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REFERENCES

Allely, C. S. (2019). Understanding and recognising the female phenotype of autism spectrum disorder and the "camouflage" hypothesis: A systematic PRISMA review. *Advances in Autism*, *5*(1), 14–37. https://doi.org/10.1108/AIA-09-2018-0036

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5™* (5th ed.).

Babb, C., Brede, J., Jones, C. R. G., Elliott, M., Zanker, C., Tchanturia, K., Serpell, L., Mandy, W., & Fox, J. R. E. (2021). 'It's not that they don't want to access the support… it's the impact of the autism': The experience of eating disorder services from the perspective of autistic women, parents and healthcare professionals. *Autism*, *25*(5), 1409–1421. https://doi.org/10.1177/1362361321991257

Babb, C., Brede, J., Jones, C. R. G., Serpell, L., Mandy, W., & Fox, J. (2022). A comparison of the eating disorder service experiences of autistic and non-autistic women in the UK. *European Eating Disorders Review*, *30*(5), 616–627. https://doi.org/10.1002/erv.2930

Bargiela, S., Steward, R., & Mandy, W. (2016). The experiences of late-diagnosed women with autism spectrum conditions: An investigation of the female autism phenotype. *Journal of Autism and Developmental Disorders*, *46*(10), 3281–3294. https://doi.org/10.1007/s10803-016-2872-8

Bentz, M., Westwood, H., Jepsen, J. R. M., Plessen, K. J., & Tchanturia, K. (2020). The autism diagnostic observation schedule: Patterns in individuals with anorexia nervosa. *European Eating Disorders Review*, *28*(5), 571–579. https://doi.org/10.1002/erv.2757

Bitsika, V., & Sharpley, C. F. (2018). Specific aspects of repetitive and restricted behaviours are of greater significance than sensory processing difficulties in eating disturbances in high-functioning young girls with ASD. *Journal of Developmental and Physical Disabilities*, *30*(2), 259–267. https://doi.org/10.1007/s10882-017-9583-8

Boltri, M., & Sapuppo, W. (2021). Anorexia nervosa and autism spectrum disorder: A systematic review. *Psychiatry Research*, *306*:114271. https://doi.org/10.1016/j.psychres.2021.114271

Brand-Gothelf, A., Parush, S., Eitan, Y., Admoni, S., Gur, E., & Stein, D. (2016). Sensory modulation disorder symptoms in anorexia nervosa and bulimia nervosa: A pilot study. *International Journal of Eating Disorders*, *49*(1), 59–68. https://doi.org/10.1002/eat.22460

Brede, J., Babb, C., Jones, C., Elliott, M., Zanker, C., Tchanturia, K., Serpell, L., Fox, J., & Mandy, W. (2020). "For me, the anorexia is just a symptom, and the cause is the autism": Investigating restrictive eating disorders in autistic women. *Journal of Autism and Developmental Disorders*, *50*(12), 4280–4296. https://doi.org/10.1007/s10803-020-04479-3

Cardi, V., Mallorqui-Bague, N., Albano, G., Monteleone, A. M., Fernandez-Aranda, F., & Treasure, J. (2018). Social difficulties as risk and maintaining factors in anorexia nervosa: A mixed-method investigation. *Frontiers in Psychiatry*, *9*):12. https://doi.org/10.3389/fpsyt.2018.00012

Cardi, V., Tchanturia, K., & Treasure, J. (2018). Premorbid and illness-related social difficulties in eating disorders: An overview of the literature and treatment developments. *Current neuropharmacology*, *16*(8), 1122–1130. https://doi.org/10.2174/1570159X16666180118100028

Dinkler, L., Taylor, M. J., Råstam, M., Hadjikhani, N., Bulik, C. M., Lichtenstein, P., Gillberg, C., & Lundström, S. (2021). Anorexia nervosa and autism: A prospective twin cohort study. *Journal of Child Psychology and Psychiatry*, *62*(3), 316–326. https://doi.org/10.1111/jcpp.13265

Doris, E., Westwood, H., Mandy, W., & Tchanturia, K. (2014). A qualitative study of friendship in patients with anorexia nervosa and possible autism spectrum disorder. *Psychology*, *05*(11), 1338–1349. https://doi.org/10.4236/psych.2014.511144

Duvekot, J., van der Ende, J., Verhulst, F. C., Slappendel, G., van Daalen, E., Maras, A., & Greaves-Lord, K. (2017). Factors influencing the probability of a diagnosis of autism spectrum disorder in girls versus boys. *Autism*, *21*(6), 646–658. https://doi.org/10.1177/1362361316672178

Gaudio, S., Brooks, S. J., & Riva, G. (2014). Nonvisual multisensory impairment of body perception in anorexia nervosa: A systematic review of neuropsychological studies. *PLoS One*, *9*(10), e110087. https://doi.org/10.1371/journal.pone.0110087

Green, R. M., Travers, A. M., Howe, Y., & McDougle, C. J. (2019). Women and autism spectrum disorder: Diagnosis and implications for treatment of adolescents and adults. *Current Psychiatry Reports*, *21*(4), 22. https://doi.org/10.1007/s11920-019-1006-3

Greene, R. K., Vasile, I., Bradbury, K. R., Olsen, A., & Duvall, S. W. (2022). Autism Diagnostic Observation Schedule (ADOS-2) elevations in a clinical sample of children and adolescents who do not have autism: Phenotypic profiles of false positives. *The Clinical Neuropsychologist*, *36*(5), 943–959. https://doi.org/10.1080/13854046.2021.1942220

Haney, J. L. (2016). Autism, females, and the DSM-5: Gender bias in autism diagnosis. *Social Work in Mental Health*, *14*(4), 396–407. https://doi.org/10.1080/15332985.2015.1031858

Holliday, J., Tchanturia, K., Landau, S., Collier, D., & Treasure, J. (2005). Is impaired set-shifting an endophenotype of anorexia nervosa?*American Journal of Psychiatry*, *162*(12), 2269–2275. https://doi.org/10.1176/appi.ajp.162.12.2269

Huke, V., Turk, J., Saeidi, S., Kent, A., & Morgan, J. F. (2013). Autism spectrum disorders in eating disorder populations: A systematic review. *European Eating Disorders Review*, *21*(5), 345–351. https://doi.org/10.1002/erv.2244

Hus, V., & Lord, C. (2014). The autism diagnostic observation schedule, module 4: Revised algorithm and standardized severity scores. *Journal of Autism and Developmental Disorders*, *44*(8), 1996–2012. https://doi.org/10.1007/s10803-014-2080-3

Isomaa, R., Lukkarila, I.-L., Ollila, T., Nenonen, H., Charpentier, P., Sinikallio, S., & Karhunen, L. (2016). Development and preliminary validation of a Finnish version of the Eating Disorder Examination Questionnaire (EDE-Q). *Nordic Journal of Psychiatry*, *70*, 542–546. https://doi.org/10.1080/08039488.2016.1179340

Kerr-Gaffney, J., Hayward, H., Jones, E. J. H., Halls, D., Murphy, D., & Tchanturia, K. (2021). Autism symptoms in anorexia nervosa: A comparative study with females with autism spectrum disorder. *Molecular Autism*, *12*(1), 47. https://doi.org/10.1186/s13229-021-00455-5

Kerr-Gaffney, J., Harrison, A., & Tchanturia, K. (2020). The social responsiveness scale is an efficient screening tool for autism spectrum disorder traits in adults with anorexia nervosa. *European Eating Disorders Review*, *28*(4), 433–444. https://doi.org/10.1002/erv.2736

King, J. A., Korb, F. M., Vettermann, R., Ritschel, F., Egner, T., & Ehrlich, S. (2019). Cognitive overcontrol as a trait marker in anorexia nervosa? Aberrant task- and response-set switching in remitted patients. *Journal of Abnormal Psychology*, *128*(8), 806–812. https://doi.org/10.1037/abn0000476

Kinnaird, E., Norton, C., Stewart, C., & Tchanturia, K. (2019). Same behaviours, different reasons: What do patients with co-occurring anorexia and autism want from treatment. *International Review of Psychiatry*, *31*(4), 308–317. https://doi.org/10.1080/09540261.2018.1531831

Koch, S. V., Larsen, J. T., Mouridsen, S. E., Bentz, M., Petersen, L., Bulik, C., Mortensen, P. B., & Plessen, K. J. (2015). Autism spectrum disorder in individuals with anorexia nervosa and in their first- and second-degree relatives: Danish nationwide register-based cohort-study. *British Journal of Psychiatry*, *206*(5), 401–407. https://doi.org/10.1192/bjp.bp.114.153221

Koomar, T., Thomas, T. R., Pottschmidt, N. R., Lutter, M., & Michaelson, J. J. (2021). Estimating the prevalence and genetic risk mechanisms of ARFID in a large autism cohort. *Frontiers in Psychiatry*, *12*(12), 668297. https://doi.org/10.3389/fpsyt.2021.668297

Krug, I., Penelo, E., Fernandez-Aranda, F., Anderluh, M., Bellodi, L., Cellini, E., di Bernardo, M., Granero, R., Karwautz, A., Nacmias, B., Ricca, V., Sorbi, S., Tchanturia, K., Wagner, G., Collier, D., & Treasure, J. (2013). Low social interactions in eating disorder patients in childhood and adulthood: A multi-centre European case control study. *Journal of Health Psychology*, *18*(1), 26–37. https://doi.org/10.1177/1359105311435946

Lord, C., Rutter, M., DiLavore, P., Risi, S., Gotham, K., Bishop, S., Luyster, R., & Guthrie, W. (2012). *Autism diagnostic observation schedule -2 Autismikirjon diagnostinen havainnointimenetelmä*. Hogrefe.

Mandy, W., & Tchanturia, K. (2015). Do women with eating disorders who have social and flexibility difficulties really have autism? A case series. *Molecular Autism*, *6*(6), 1–10. https://doi.org/10.1186/2040-2392-6-6

Milner, V., McIntosh, H., Colvert, E., & Happé, F. (2019). A qualitative exploration of the female experience of autism spectrum disorder (ASD). *Journal of Autism and Developmental Disorders*, *49*(6), 2389–2402. https://doi.org/10.1007/s10803-019-03906-4

Nazar, B. P., Peynenburg, V., Rhind, C., Hibbs, R., Schmidt, U., Gowers, S., Macdonald, P., Goddard, E., Todd, G., Micali, N., & Treasure, J. (2018). An examination of the clinical outcomes of adolescents and young adults with broad autism spectrum traits and autism spectrum disorder and anorexia nervosa: A multi centre study. *International Journal of Eating Disorders*, *51*(2), 174–179. https://doi.org/10.1002/eat.22823

Nielsen, S., Anckarsäter, H., Gillberg, C., Gillberg, C., Råstam, M., & Wentz, E. (2015). Effects of autism spectrum disorders on outcome in teenage-onset anorexia nervosa evaluated by the Morgan-Russell outcome assessment schedule: A controlled community-based study. *Molecular Autism*, *6*, 14. https://doi.org/10.1186/s13229-015-0013-4

Råstam, M., Gillberg, C., & Wentz, E. (2003). Outcome of teenage-onset anorexia nervosa in a Swedish community-based sample. *European Child & Adolescent Psychiatry*, *12*(Suppl. 1), I78–I90. https://doi.org/10.1007/s00787-003-1111-y

Roberts, M. E., Tchanturia, K., & Treasure, J. L. (2010). Exploring the neurocognitive signature of poor set-shifting in anorexia and bulimia nervosa. *Journal of Psychiatric Research*, *44*(14), 964–970. https://doi.org/10.1016/j.jpsychires.2010.03.001

Rodrigues, J. V. S., Poli, M. C. F., Petrilli, P. H., Dornelles, R. C. M., Turcio, K. H., & Theodoro, L. H. (2023). Food selectivity and neophobia in children with autism spectrum disorder and neurotypical development: A systematic review. *Nutrition Reviews*, *81*(8), 1034–1050. https://doi.org/10.1093/nutrit/nuac112

Saure, E., Ålgars, M., Laasonen, M., & Raevuori, A. (2022). Cognitive behavioral and cognitive remediation strategies for managing Co-occurring anorexia nervosa and elevated autism spectrum traits. *Psychology Research and Behavior Management*, *15*, 1005–1016. https://doi.org/10.2147/PRBM.S246056

Saure, E., Castrén, M., Mikkola, K., & Salmi, J. (2023). Intellectual disabilities moderate sex/gender differences in autism spectrum disorder: A systematic review and meta-analysis. *Journal of Intellectual Disability Research*, *67*(1), 1–34. https://doi.org/10.1111/jir.12989

Saure, E., Laasonen, M., Lepistö-Paisley, T., Mikkola, K., Ålgars, M., & Raevuori, A. (2020). Characteristics of autism spectrum disorders are associated with longer duration of anorexia nervosa: A systematic review and meta-analysis. *International Journal of Eating Disorders*, *53*(7), 1056–1079. https://doi.org/10.1002/eat.23259

Saure, E., Laasonen, M., & Raevuori, A. (2021). Anorexia nervosa and comorbid autism spectrum disorders. *Current Opinion in Psychiatry*, *34*(6), 569–575. https://doi.org/10.1097/YCO.0000000000000742

Saure, E., Lepistö-Paisley, T., Raevuori, A., & Laasonen, M. (2022). Atypical sensory processing is associated with lower body mass index and increased eating disturbance in individuals with anorexia nervosa. *Frontiers in Psychiatry*, *13*(101545006), 850594. https://doi.org/10.3389/fpsyt.2022.850594

Saure, E., Raevuori, A., Laasonen, M., & Lepistö-Paisley, T. (2022). Emotion recognition, alexithymia, empathy, and emotion regulation in women with anorexia nervosa. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, *27*(8), 3587–3597. https://doi.org/10.1007/s40519-022-01496-2

Sedgewick, F., Kerr-Gaffney, J., Leppanen, J., & Tchanturia, K. (2019). Anorexia nervosa, autism, and the ADOS: How appropriate is the new algorithm in identifying cases. *Frontiers in Psychiatry*, *10*:507. https://doi.org/10.3389/fpsyt.2019.00507

Spek, A. A., van Rijnsoever, W., van Laarhoven, L., & Kiep, M. (2020). Eating problems in men and women with an autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *50*(5), 1748–1755. https://doi.org/10.1007/s10803-019-03931-3

SPSS 28.0. IBM Corp. (2021). *IBM SPSS Statistics for Macintosh, Version 28.0*. IBM Corp.

Stewart, C. S., McEwen, F. S., Konstantellou, A., Eisler, I., & Simic, M. (2017). Impact of ASD traits on treatment outcomes of eating disorders in girls. *European Eating Disorders Review*, *25*(2), 123–128. https://doi.org/10.1002/erv.2497

Tapajóz, F., Soneira, S., Catoira, N., Aulicino, A., & Allegri, R. F. (2019). Impaired theory of mind in unaffected first-degree relatives of patients with anorexia nervosa. *European Eating Disorders Review*, *27*(6), 692–699. https://doi.org/10.1002/erv.2701

Tauro, J. L., Wearne, T. A., Belevski, B., Filipčíková, M., & Francis, H. M. (2022). Social cognition in female adults with Anorexia Nervosa: A systematic review. *Neuroscience and Biobehavioral Reviews*, *132*, 197–210. https://doi.org/10.1016/j.neubiorev.2021.11.035

Tenconi, E., Santonastaso, P., Degortes, D., Bosello, R., Titton, F., Mapelli, D., & Favaro, A. (2010). Set-shifting abilities, central coherence, and handedness in anorexia nervosa patients, their unaffected siblings and healthy controls: Exploring putative endophenotypes. *The World Journal of Biological Psychiatry*, *11*(6), 813–823. https://doi.org/10.3109/15622975.2010.483250

Thomas, J., & Eddy, K. (2019). *Cognitive-behavioral therapy for Avoidant/Restrictive Food Intake Disorder*. Cambridge University Press.

Wechsler, D. (1999). Wechsler abbreviated scale of intelligence (WASI). The Psychological Corporation.

Wechsler, D. (2008). *Wechsler adult intelligence scale -IV, manual*. Psychological Corp.

Westwood, H., Mandy, W., Simic, M., & Tchanturia, K. (2018). Assessing ASD in adolescent females with anorexia nervosa using clinical and developmental measures: A preliminary investigation. *Journal of Abnormal Child Psychology*, *46*(1), 183–192. https://doi.org/10.1007/s10802-017-0301-x

Westwood, H., Stahl, D., Mandy, W., & Tchanturia, K. (2016). The set-shifting profiles of anorexia nervosa and autism spectrum disorder using the Wisconsin Card Sorting Test: A systematic review and meta-analysis. *Psychological Medicine*, *46*(9), 1809–1827. https://doi.org/10.1017/S0033291716000581

Zhang, R., Birgegård, A., Fundín, B., Landén, M., Thornton, L. M., Bulik, C. M., & Dinkler, L. (2022). Association of autism diagnosis and polygenic scores with eating disorder severity. *European Eating Disorders Review*, *30*(5), 442–458. https://doi.org/10.1002/erv.2941

SUPPORTING INFORMATION

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