



Eating Problems in Men and Women with an Autism Spectrum Disorder

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Abstract

The presence of eating problems was assessed in 53 males and 36 females with an autism spectrum disorder (ASD), with and without housing and residential support. The results were compared to a neurotypical group of 30 men and 38 women. The results indicate that men and especially women with ASD experience various eating problems. Women with ASD also recognized symptoms of an eating disorder. Hence, it is important to be aware of eating problems and symptoms of an eating disorder in adults with ASD, to ensure they receive the care they need.

Keywords Autism spectrum disorders · Eating problems · Eating disorders · SWEAA

Autism spectrum disorders (ASD) are neurobiological developmental disorders, characterized by persistent deficits in social communication and the presence of restricted, repetitive patterns of behavior (American Psychiatric Association 2013). Many children and adults with ASD experience comorbidities (Mannion and Leader 2013). A high level of functioning does not seem to be a protective factor, since comorbidity seems most present in the high functioning adults (Joshi et al. 2013; Hofvander et al. 2009). A recent study showed that 79% of adults with ASD meets the criteria for a comorbid psychiatric disorder at least once during their life (Lever and Geurts 2016). One of the comorbid concerns for which there is growing interest is eating problems. Sharp et al. (2013) conducted a meta-analysis and a review to examine feeding related difficulties in children with ASD. Their findings varied from problems in dietary intake and nutrition, to the presence of food selectivity or food refusal, problems regarding mealtime behaviors and the presence of a pediatric feeding disorder. Feeding related

problems appeared to occur five times more in children with ASD, compared to a neurotypical control group (Sharp et al. 2013). About half of the children with ASD can be described as selective eaters, which refers to food refusal, a limited repertoire of accepted foods and a high-frequency of single food intake (Mari-Bauset et al. 2014). Vissoker and colleagues (2015) described food selectivity as the most common feeding concern documented among children with ASD. Further, research indicates that children with ASD experience food neophobia (the reluctance of eating new food) more often than other children, which has been associated with fear of the unknown and sensitivity to sensory aspects of food (Cooke et al. 2006). The underlying causes of eating and feeding problems in children with ASD are not fully clear, although sensory hypo- and hyperreactivity, restricted interests, behavioral rigidity and motor issues seem to play an important role (Mari-Bauset et al. 2014).

Documentation on eating problems in adults with ASD is limited and available literature mainly focuses on adults with mental retardation and on children (Råstam 2008). Therefore, we do not know whether the eating problems that exist in children with ASD, continue in adulthood. Gaining more knowledge about eating inadequacies in adults with ASD is of clinical importance, especially since this can lead to medical and developmental issues, including undernutrition (Sharp et al. 2013; Vissoker et al. 2015). For this reason, we decided to examine eating problems in adults with ASD.

In the general population, women seem to experience more eating problems than men (Kiefer et al. 2005).

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Remarkably, in studies examining eating problems in ASD, men and women were never directly compared. With this respect, it may be relevant to note that women with ASD report more hyperreactivity to sensory input than men with ASD (Lai et al. 2015). Since eating is a complex sensory experience, with ranging tastes, smells, sounds and textures, this may result in a higher level of eating problems in women with ASD than in men with ASD. Therefore, in this study we aim to assess eating problems in both men and women with ASD and compare their results to neurotypical controls. Based on previous research, we expect to find more eating problems in both men and women with ASD than in the neurotypical males and females. Furthermore, we expect to find that women with ASD experience more eating problems than men with ASD.

Clinical experience with adults with ASD shows that practical support and home guidance can be helpful with eating problems, but there is no scientific evidence that proves this. For this reason, we will also include a research group with ASD that receives housing and residential support. We expect to find that the adults with ASD who receive this kind of support, experience less eating problems than the adults with ASD who do not receive this.

Methods

Procedure

Most of the participants with ASD were recruited from the ‘Autism information center’ in the Netherlands, which is an outpatient treatment setting for adults with ASD. The participants visited this institution for various reasons, for example for problems at their school or work or for marital problems. The participants were all diagnosed by a trained psychologist or psychiatrist with an autism spectrum disorder, based on DSM-IV or DSM-5 criteria. A smaller group of participants with ASD was recruited via ‘Lister’, an institution that provides housing and residential support for adults with ASD in the Netherlands. The participants from Lister were all diagnosed with an autism spectrum disorder, based on DSM-IV or DSM-5 criteria. They were diagnosed by a trained psychologist or psychiatrist, before they came into the care of Lister. An official ASD diagnosis is a requirement for admission to the care of Lister.

Among the residential participants there were only a few women, making the female residential sample size too small to ensure sufficient power. Therefore, we decided to only include the male subjects in our study.

All of the participants recruited via Lister received support in their home situation. They either lived independently with home guidance or lived in a guided living situation. The support provided by Lister for both types of guidance

focused primarily on developing, improving and maintaining skills that are needed to improve independence. Once in the care of Lister, an assessment was made in order to examine the capacity of the client to clean, do groceries, prepare varied meals, use a daily planner and so forth. If necessary, the participants were trained as effectively as possible in improving these skills. This was done through practical home guidance executed by an in ASD specialized counselor who visited the participant multiple times each week.

Participants from both the Autism information center and Lister who were diagnosed with genetic conditions or relevant neurological, psychiatric or medical conditions (e.g. ADHD, Tourette syndrome) were excluded. This was checked by asking the participants questions about the presence of these conditions and by examining previous diagnostic and medical reports. Also, it was examined whether participants were under a special diet with one of the additional questions of the Swedish Eating Assessment for Autism spectrum disorders [SWEAA] (Karlsson et al. 2013). This was not the case for any of the participants in this study. Furthermore, from clinical observations there were no concerns about significantly low body weight, although this was not formally checked by measuring height and weight.

The neurotypical control subjects were recruited from the general population by ads in local newspapers and by word of mouth. Healthy controls were not included in the present study if they had a history of psychiatric illness or if autism ran in the family. In total, 157 participants agreed to participate in this study and signed informed consent forms prior to the start of this study. The individuals ranged in age from 18 to 60 years. The group is comprised of 53 men with ASD, 36 women with ASD, 30 neurotypical men and 38 neurotypical women (see Table 1).

Table 1 Characteristics participants

	N	Level of education A = low to medium B = high	Age	Living situation A = alone B = with others C = residential D = Sheltered
Men with ASD	30	A = 15 B = 15	40.7 (12.4)	A = 4 B = 26
Women with ASD	36	A = 17 B = 19	38.8 (10.9)	A = 11 B = 25
Men with ASD living sheltered or residential	23	A = 18 B = 5	35.2 (12.7)	C = 8 D = 15
Control group men	30	A = 13 B = 18	38 (13.2)	A = 5 B = 26
Control group women	38	A = 8 B = 30	34.4 (13.5)	A = 10 B = 28

Assessment of Disorder

The diagnoses of the participants with ASD were established through evaluation of historic and current symptomatology. The men and women with ASD in the outpatient setting were examined using the ADI-R (Lord et al. 1994). When parental information was not available, an older sibling was interviewed. In these instances, further information about early childhood was gathered, for example from baby books and early clinical reports, until sufficient information was collected to fill in the diagnostic algorithm. The ADI-R was administered by psychologists who were officially trained in the administration and scoring of this instrument.

Furthermore, a semi-structured interview was administered to all subjects, whereby all ASD criteria of the DSM-5 were examined (APA 2013). For each diagnostic criterion, a standard primary question was asked, followed by questions to clarify whether the participant met the criteria of the given item. Finally, the diagnoses were based on a clinical judgement of all the information that was gathered. Only those participants who met DSM-5 criteria of an autism spectrum disorder were included in the present study.

The participants at ‘Lister’, who received housing and residential support, also underwent a diagnostic process by a psychiatrist or psychologist and were all diagnosed with ASD. However, no standardized instruments were used and due to time-related issues, it was not possible to examine all participants again using standardized measures. It may be noteworthy that clinical observations did not raise doubt about the diagnoses of the participants. Still, non-use of

formal diagnostic instruments in this group of participants is a weakness of this study.

Assessment of Eating Problems

To examine eating problems in the participant groups, a Dutch translation of the Swedish Eating Assessment for Autism spectrum disorders [SWEAA] (Karlsson et al. 2013; Dutch translation:; Spek et al. 2014) was used. The SWEAA was administered in a paper-and-pencil format, similarly across groups.

The SWEAA was developed after a thorough literature review and it can be used to measure eating problems in adults with ASD and an (above) average intelligence. This questionnaire exists of the following eight subscales: perception, motor control, purchase of food, eating behavior, mealtime surroundings, social situation at mealtime, other behavior associated with disturbed eating, and Hunger/satiety (see Table 2). Reliability for the original version of the SWEAA was high, with Cronbach’s alphas between 0.70 and above 0.80 for the subscales (Karlsson et al. 2013). Furthermore, with regard to test–retest reliability there was good agreement for all subscales (mean ICC 0.86). The Dutch translation was done by means of forward and back-translation by an independent translator, whose mother tongue is English and who had no knowledge of the questionnaire and of the present study. Reliability of the Dutch translation of the SWEAA was good with a Cronbach’s alpha of 0.82 (George and Mallery 2003).

Table 2 Subscales SWEAA

Subscale	Description
Perception	Sensitivity to sensory input related to food, such as smell, taste and texture For example: ‘I am over-sensitive to certain flavours’
Motor control	Motor control problems that can influence eating behaviour, such as problems chewing or swallowing food. For example: ‘I spill while I eat’
Purchase of food	Preference for a brand of food or supermarket For example: ‘My food must be of a certain brand’
Eating behaviour	Selectivity in eating, preference for certain food, limited repertoire of food and difficulty trying new foods For example: ‘I eat the same food every day’
Mealtime surroundings	Routines around mealtime such as where to eat and how cutlery is placed For example: ‘I find it difficult to change seats at the dining table’
Social situation at mealtime	Difficulty to adapt eating behaviour to other people present in the eating situation For example: ‘I eat in my bedroom’
Other behaviour associated with disturbed eating	Symptoms of an eating disorder, such as purging, dieting or fasting For example: ‘I use diuretics’
Hunger/satiety	Ability to signal when hungry or full For example: ‘I feel when I am hungry’
Simultaneous capacity	Difficulty to do two things simultaneously during a meal For example: ‘I find it difficult to do two things simultaneously during a meal, e.g. chewing and cutting the food’
Pica	Eating things that others consider inedible, such as soil or mortar For example: ‘I eat things that others consider inedible (e.g. mortar or soil)’

There are two single item measures, inquiring about Pica and the capacity to do things simultaneously during a meal. Single item measures are seen as statistically questionable, for example because the internal consistency reliability cannot be computed and because these items are more vulnerable to measurement errors. On the other hand, the use of single items may reduce the chance of common method variance. Furthermore, previous research indicated that single-item measures have comparable predictive validity compared to multiple-item measures (Gardner et al. 1998; Hoepfner et al. 2011). For this reason and since the contents of the single items are relevant for our study, we decided to include the single items in our analyses.

Results

In the analyses, we have made the following comparisons:

1. Men with ASD and housing/residential support (further named ASD+ support), men with ASD without this kind of support and a control group of men without psychiatric diagnosis.
2. Women with ASD and a control group of women without psychiatric diagnosis.
3. Men with ASD and women with ASD.

We controlled for the effects of age, since people may acquire more or different eating skills as they grow older. Living situation was also included as a covariate since in all participant groups some of the participants lived alone and some with others, for example with family. The presence of other people may be of influence on eating habits. Furthermore, we controlled for education, because a higher

education might be related to an increased knowledge about food and health.

A Comparison Between Men with ASD and Housing/ Residential Support, Men with ASD Without this Kind of Support and a Control Group of Men Without Psychiatric Diagnosis

Subscale scores on the SWEAA were compared between the three groups, while controlling for the effects of age, living situation (alone or together with others) and education. To this end, a MANCOVA was ran, with age, living situation and education as covariates. The analyses showed no significant effect of the covariates. The results of the MANCOVA revealed a significant main effect of diagnostic group (Wilks' $\lambda=0.535$, $F(20, 136)=2.495$, $p=0.001$, partial eta squared=0.268). At subscale level, significant differences were found between the three groups in Eating behavior, Mealtime surroundings, Social situation at mealtime, Simultaneous capacity and in the total score (see Table 3). The effect size of the differences in the subscales Eating behavior, and Mealtime surroundings can be considered as medium, while the effect size of the difference in Social situation at mealtime, Simultaneous capacity and the total score can be described as large.

Bonferroni posthoc analyses showed that the significant differences on the subscales Eating behavior ($p=0.005$) and Mealtime surrounding ($p=0.006$) are due to the difference between the control group and the men with ASD.

The significant outcome on the subscale Social situation at mealtime can be attributed to the control group obtaining lower scores than the men with ASD ($p<0.001$) and the men with ASD + support ($p=0.010$). The significant differences on the subscale Simultaneous capacity can be explained by the lower scores of the control group, compared to the

Table 3 Results of the three male groups

Subscales	Men with ASD (N=30) (A)	Men with ASD with housing support (N=23) (B)	Control group men (N=30) (C)	Significance	Effect size (partial eta squared)	Comparison
A. Perception	22.5 (6)	18.6 (6.5)	19.8 (4.6)	0.068	0.067	
B. Motor control	13.1 (3.8)	13 (4.4)	11 (2.7)	0.069	0.067	
C. Purchase of food	8.3 (2.9)	7.2 (2.7)	8.1 (1.6)	0.175	0.044	
D. Eating behaviour	12.6 (4.7)	11.8 (4.6)	9.7 (2.8)	0.017	0.100	A > C
E. Mealtime surroundings	19 (7.6)	17.9 (7.2)	14.3 (2.9)	0.022	0.095	A > C
F. Social situation at mealtime	23.4 (4.8)	23 (5.1)	18.7 (3.8)	>0.001	0.220	A and B > C
G. Other behaviour associated with disturbed eating	9.2 (2.8)	9.2 (2.2)	9.1 (2.4)	0.741	0.008	
H. Hunger/satiety	3.9 (1.7)	3.8 (1.4)	3.4 (1.2)	0.095	0.059	
I. Simultaneous capacity	2.6 (1.6)	1.4 (0.9)	1.2 (0.5)	<0.001	0.236	A and B > C
J. Pica	1.1 (0.4)	1 (0.2)	1.3 (0.8)	0.377	0.025	
Total	115.8 (24.8)	106.8 (24.4)	96.6 (13.3)	0.003	0.142	A > C

men with ASD ($p < 0.001$) and the men with ASD + support ($p = 0.025$). Differences in the total score on the SWEAA are due to the men with ASD outscoring the control group ($p = 0.001$).

A Comparison Between Women with ASD and a Control Group of Women Without Psychiatric Diagnosis

A MANCOVA was performed, using age, living situation and education as covariates. The analyses showed a significant effect of age (Wilks' $\lambda = 0.662$, $F(10, 60) = 3.057$, $p = 0.003$, partial eta squared = 0.338). After controlling for age, the MANCOVA revealed a significant main effect for diagnosis (Wilks' $\lambda = 0.55$, $F(10, 60) = 4.844$, $p < 0.001$, partial eta squared = 0.447). On the subscales Perception, Mealtime surroundings, Social situation at mealtime and Simultaneous capacity, significantly higher scores were observed in the women with ASD, compared to the female control group. The effect size of these differences is considered large. Significantly higher scores with a medium effect size were identified in the women with ASD on the subscales Purchase of food, Eating behavior. Other behavior associated with disturbed eating and hunger/satiety. No difference was found with regard to the subscales Motor control and Pica (see Table 4).

A Comparison Between Men with ASD and Women with ASD

A MANCOVA controlling for age, living situation and education showed a significant effect of living situation (Wilks' $\lambda = 0.649$, $F(10, 52) = 2.814$, $p = 0.007$,

partial eta squared = 0.351). After controlling for this factor, the analyses revealed a significant main effect for gender (Wilks' $\lambda = 0.685$, $F(10, 52) = 2.392$, $p = 0.020$, partial eta squared = 0.315). With regard to the subscales, women with ASD obtained significantly higher scores on Perception and Purchase of food, while the men with ASD scored significantly higher on the subscale Motor control (see Table 5). The effect size of these differences can be described as medium.

Discussion

In the present study, we examined eating problems in men and women with ASD and compared findings to neurotypical males and females. Both male ASD-groups reported difficulty to adapt their eating behavior to other people present (subscale Social situation at mealtime) and having problems doing two things simultaneously during a meal (subscale Simultaneous capacity). With regard to the latter, multitasking has been previously shown to be difficult for high functioning individuals with ASD (Mannion and Leader 2013; Rajendran et al. 2011). Evidence suggests that difficulty with multitasking is related to the impairments in executive functioning, which characterize ASD (Rajendran et al. 2011).

Regarding the social situation at mealtime, it appears to be challenging for both male ASD groups to adapt their eating behavior to the social environment. They report a preference to eat alone and are less inclined to socialize while eating. For example, one of the men with ASD in this study expressed his surprise that other people would want to communicate with others during dinner. Combining eating with social interaction appears challenging for people with ASD,

Table 4 Results of the two female groups

Subscales	Women with ASD (N = 36)	Control group women (N = 38)	Significance	Effect size (partial eta squared)
A. Perception	26.4 (8.9)	20.6 (4.9)***	<0.001	0.170
B. Motor control	11.4 (3.7)	11.1 (2.6)	0.540	0.005
C. Purchase of food	10.1 (2.9)	8.2 (1.9)**	0.004	0.115
D. Eating behaviour	13.2 (4.8)	10.6 (2.7)**	0.007	0.102
E. Mealtime surroundings	24 (10.1)	14.6 (3.5)***	<0.001	0.283
F. Social situation at mealtime	24.2 (4.6)	19.9 (5.3)***	<0.001	0.162
G. Other behaviour associated with disturbed eating	10.5 (3.9)	8.8 (1.2)*	0.012	0.087
H. Hunger/satiety	4.6 (1.7)	3.8 (1.5)*	0.043	0.058
I. Simultaneous capacity	2.4 (1.4)	1.2 (0.6)***	<0.001	0.164
J. Pica	1.0 (0.2)	1.0 (0)	0.589	0.004
Total	127.8 (33.9)	99.9 (13.5)***	<0.001	0.240

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Table 5 Comparison males and females with ASD

Subscales	Men with ASD (N=30)	Women with ASD (N=36)	Significance	Effect size (partial eta squared)
A. Perception	22.5 (6.0)	26.4 (8.9)	0.036*	0.07
B. Motor control	13.1 (3.8)	11.4 (3.7)	0.049*	0.062
C. Purchase of food	8.3 (2.9)	10.1 (2.9)	0.014*	0.095
D. Eating behaviour	12.6 (4.7)	13.2 (4.8)	0.938	0.0
E. Mealtime surroundings	19 (7.6)	24 (10.1)	0.058	0.058
F. Social situation at mealtime	23.4 (4.8)	24.2 (4.6)	0.805	0.001
G. Other behaviour associated with disturbed eating	9.2 (2.8)	10.5 (3.9)	0.231	0.023
H. Hunger/satiety	3.9 (1.8)	4.6 (1.7)	0.275	0.019
I. Simultaneous capacity	2.6 (1.6)	2.4 (1.4)	0.656	0.003
J. Pica	1.1 (0.4)	1 (0.2)	0.354	0.014
Total	115.8 (24.8)	127.8 (33.9)	0.189	0.028

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

which may be related to their difficulty to manage small talk and make eye contact (Råstam 2008). Combining this with chewing and using fork and knife to eat may be even more strenuous.

Results further indicate that men with ASD who do not receive housing/residential support, have a strong preference for certain foods (subscale Eating behavior) and experience eating rituals (subscale Mealtime surroundings). Interestingly, the men with ASD who received housing support did not report problems in these areas. This may be due to the support they acquired in the living situation, in which emphasis is put on a healthy lifestyle and retaining an eating pattern. Further research to examine this more thoroughly is needed. If our findings are replicated and there is indeed a clear relationship with support in the home situation, this may be of interest in clinical practice. Current interventions that target eating problems have been developed mainly for children with ASD and use therapeutic techniques, for example positive or negative reinforcement (Ledford and Gast 2006). Future studies are needed to examine whether general support in the home situation can also be of help in reducing eating problems of adults with ASD.

With respect to the females who participated in our study, large differences were observed. The women with ASD reported more eating problems compared to the control group women, on almost all subscales except for Pica and Motor control. The extent to which eating problems were reported by the women with ASD is worrying. Our results give rise to the hypothesis that eating problems as they appear in children with ASD, are still present in adulthood, at least in the female group. Given the high significance and the large effect size of four subscales and the total score, it is likely that these problems lead to significant impairment in

daily life functioning. The women with ASD predominantly reported having eating rituals (Mealtime surroundings), sensory sensitivity to the smell, taste, texture and visual appearance of food (Perception), experiencing difficulty to eat with other people and to adapt their eating behavior to the social environment (Social situation at mealtime) and having trouble doing things simultaneously during a meal (Simultaneous capacity). The eating rituals may be seen as an expression of ritualistic behavior which is characteristic for ASD (Råstam 2008). With regard to the sensory sensitivity, our findings are in line with previous research showing that 40% of high functioning adults have deviant reactions to smell and/or taste of food (Leekam et al. 2007). The reason why only our female ASD sample reported a heightened sensitivity for the sensory characteristics of food may be congruent with research showing that women with ASD experience more lifetime sensory symptoms than men with ASD (Lai et al. 2015).

The elevated scores on the subscales ‘Social situation at mealtime’ may reflect a general difficulty to adapt behavior to other people (Råstam 2008). Despite women with ASD have a greater desire to interact with others and acquire more compensatory skills than men with ASD (Lai et al. 2015), the social requirements of eating together can apparently still be a burden. Further, women with ASD reported difficulty doing things simultaneously during a meal. Similarly to the males with ASD, this might be due to problems with multi-tasking (Mannion and Leader 2013; Rajendran et al. 2011).

The female ASD group also reported characteristics of eating disorders, as shown by the elevated scores on the subscale ‘Other behavior associated with disturbed eating’. They recognized themselves in items like: ‘I refuse to eat’, and ‘I induce vomiting after meals’. Given the medium effect

size, it is important to take this heightened score seriously. Previous research shows consistent evidence that symptoms of ASD are significantly higher in an eating disorder population, compared to the general population (Westwood and Tchanturia 2017). Furthermore, there is evidence that the presence of elevated symptoms of ASD has a negative impact on outcome in individuals with an eating disorder (Nielsen et al. 2015; Huke et al. 2014; Westwood and Tchanturia 2017). This stresses the need to gain more insight in the underlying causes of eating disorders in women with ASD. The present study indicates that women with ASD, who were not (previously) diagnosed with an eating disorder, do experience symptoms of an eating disorder. A possible explanation may be that the experience of eating problems in girls with ASD leads to an increased vulnerability to develop (symptoms of) an eating disorder later in life. It is important that this is further addressed in future research.

Our female ASD group did not report symptoms of pica or motor control issues. There is evidence that pica is more prevalent in lower functioning and institutionalized adults with ASD (Råstam 2008), which may explain why the adults with ASD in our sample did not report this. With regard to motor control issues, previous research pointed out that women with ASD are less impaired in their fine motor skills than men with ASD (Mandy et al. 2012). This may explain why the women with ASD in our sample did not report problems with motor control while eating, while the men with ASD did recognize motor control issues.

We also compared eating problems between males and females with ASD. Somewhat in contrast to what we expected, we found differences on only three subscales. Apparently, gender differences in ASD symptoms do not result in large discrepancies in eating problems between men and women. We expected larger differences, since women with ASD were found to have increased sensory issues compared to men with ASD (Lai et al. 2015). This raises the question whether eating problems in adults with ASD are strongly related to sensory issues. A recent study demonstrated that aspects of repetitive and restricted behaviours may be more relevant than sensory processing difficulties in eating disturbances in high-functioning young girls with ASD (Bitsika and Sharpley 2018). Although this study focused on eating disorders in children, it would be of interest to further examine whether the influence of repetitive and restricted behaviours on the development does also account for eating problems in adults with ASD.

Our study is the first to examine eating problems in high functioning men and women with ASD. Despite, there are several limitations that need to be mentioned. First, the present study was conducted with adults that have average to high cognitive abilities. Therefore, the results derived from this study cannot be generalized to ASD populations with below average (verbal) abilities. Second, the research was

conducted in relatively small populations. To generalize results to a larger group, it is important that future studies will include more participants from different populations. Third, the individuals with ASD who received housing/residential support were not diagnosed using standardized instruments. Therefore, we cannot definitely rule out that some of the individuals with this kind of support did not have an autism spectrum disorder, but, for example, another neurodevelopmental disorder. This may have biased the results. For this reason, our findings of this specific group are less reliable. In future studies, this should be taken into account.

Fourth, we did not inquire whether the participants were taking any kind of medication. Although it is questionable whether medication influences the specific eating problems we examined, we cannot rule this out. Future research is needed to further examine this.

Finally, we focused predominantly on eating problems and included only one subscale examining eating disorders. Therefore, we were not able to draw conclusions about the occurrence of eating disorders in high functioning men and women with ASD.

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Author Contributions AAS designed the study, conducted the statistical analysis, analyzed the data, wrote the initial draft of the paper, and participated in revising the manuscript and addressing the reviewers' comments. WR and LL assisted in data collection and participated in writing and revising the manuscript. MK provided guidance on statistical analysis and participated in writing the manuscript and addressing the reviewers' comments.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Human and Animal Rights This article does not contain any studies with animals performed by any of the authors.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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