

2023-07

The Intersection of Autism and Eating Disorders: Understanding Body Image and Eating Problems in Women and Girls

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Baraskewich, J. (2023). The intersection of autism and eating disorders: understanding body image and eating problems in women and girls (Doctoral thesis, University of Calgary, Calgary, Canada). Retrieved from <https://prism.ucalgary.ca>.

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The Intersection of Autism and Eating Disorders: Understanding Body Image and Eating
Problems in Women and Girls

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

GRADUATE PROGRAM IN EDUCATIONAL PSYCHOLOGY

CALGARY, ALBERTA

JULY, 2023

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Abstract

The overlap between autism and eating disorders has been increasingly noticed in clinical settings in the past decade, and researchers have highlighted several similarities between disorders (e.g., executive function difficulties, socioemotional similarities). Moreover, many autistic individuals experience significant problems related to feeding and eating, often from a young age. Despite it being widely accepted that body image disturbance is a central construct related to the development and maintenance of eating disorders, little research to date has examined body image in autistic individuals and how their experience of body image relates to eating and weight-control behaviours. This study examined whether autistic women and girls differ from their non-autistic peers in the way they perceive their bodies and aimed to understand how body image disturbances relate to eating and weight control behaviours in this population. The sample was comprised of 37 autistic women and girls (aged 16 to 24) and 37 non-autistic women and girls of the same age. Information on body image, eating, and weight-control behaviours was gathered through self-report. A multidimensional conceptualization was used to test if the two groups differ in their experience across various aspects of body image. Autistic participants had relatively high rates of body dissatisfaction, eating, and feeding problems compared to the general population. The autistic group had significantly higher attitudinal body image scores and significantly higher rates of eating problems than the non-autistic group. The results suggest that although some autistic people may experience high rates of body dissatisfaction and eating problems, these feelings and behaviours are likely motivated by different reasons than their non-autistic peers. Results of the study build on the extremely limited research in this area. Implications for clinical practice in the assessment, prevention, and treatment of eating issues in this population are discussed.

Preface

This dissertation includes one published article and two manuscripts prepared for submission to a peer-reviewed journal as well as general introduction and conclusion chapters. C. McMorris, A. McCrimmon, and K. von Ranson contributed to the conceptualization of *The Intersection of Autism and Eating Disorders: Understanding body image and eating problems in women and girls* study. S. Russell-Mayhew provided critical review throughout this thesis. J. Baraskewich was the primary contributor to the research design, facilitated data collection, and completed the majority of writing for all papers included in this thesis. Regarding the published article and manuscripts in preparation for submission, J. Baraskewich was responsible for major areas of concept formation, literature review and synthesis, data analysis and interpretation, and manuscript composition. All authors aided with the constructing and clarifying of the ideas presented and contributed to the intellectual content in the manuscripts. This study received approval from the University of Conjoint Faculties Research Ethics Board (REB20-0190).

Chapter 2 presents a published article reproduced with co-author permission (see Appendix for permissions) from *Autism : the international journal of research and practice*. This article was published with distribution rights falling under the terms of the Creative Commons Attribution 4.0 License which permits use, reproduction, and distribution of the work without further permission provided the original work is attributed. The manuscript has been published as: Baraskewich, J., von Ranson, K. M., McCrimmon, A., & McMorris, C. A. (2021). Feeding and eating problems in children and adolescents with autism: A scoping review. *Autism: the international journal of research and practice*, 25(6), 1505–1519. Chapters 3 and 4 present two manuscripts prepared for submission to autism-focused journals.

Acknowledgements

This dissertation was made possible by the generous contribution of time, energy, and support from numerous people. First and foremost, my supervisor and mentor, Dr. Carly McMorris. Thank you for always being my biggest supporter, my loudest cheerleader, and strongest advocate. It's been a long journey, but your confidence in my abilities has been unrelenting and much of who I am as a researcher and clinician I owe to you. I look forward to years of collaboration, consultation, and friendship ahead. Next, I would like to thank Drs. Adam McCrimmon and Kristin von Ranson for your thoughtful and supportive contributions that helped shape this project. Thank you as well to Dr. Shelly Russell-Mayhew for stepping up and lending your expertise and support to this project. This project would not be possible without the intellectual contributions and support from each of you.

I am grateful to the members of the ENHANCE Lab, both past and present. Thank you for the support, intellectual stimulation, and friendship over the years. To my classmate and friend, Kelsey, thank you for the countless hours spent working alongside each other, procrastinating work, and ignoring work completely. This journey would have been much worse without your friendship.

Last but not least, to my friends and family. Thank you to my Calgary friends for years of helping me decompress and thousands of kilometers spent running together and to my Thunder Bay friends for their support and love from afar. I am exceptionally grateful to my parents, who taught me the value of hard work, to never give up, and provided the love and strength to make this accomplishment possible. As well, to my brothers, who have always believed in me. Your pride in my accomplishments is felt thousands of kilometers away. Finally, thank you to my partner, Travis; your unshakeable calm, belief in my abilities, and love has carried me through.

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CHAPTER ONE: Introduction, Literature Review, and Study Overview

Autism

Autism is a neurodevelopmental condition with core features of differences in social communication and the presence of restricted, repetitive patterns of behaviour, interests, or activities (American Psychiatric Association [APA], 2022). While these core characteristics are present across affected individuals, autism is highly heterogeneous in presentation as a result of the spectrum nature of the disorder. For instance, autism can occur with or without intellectual disability and with varying levels of support needs (ranging from ‘requiring support’ to ‘requiring very substantial support’; APA, 2022), which can lead to vastly different symptom presentations. Co-occurring disorders are also commonly experienced by autistic individuals, regardless of level of severity, which further adds to the complexity of symptom presentation (Masi et al., 2017). The diagnostic category of autism spectrum disorder (ASD) was introduced in 2013 in the *Diagnostic and Statistical Manual of Mental Disorders – 5th Edition (DSM-5)*; APA, 2013) to improve diagnostic clarity by collapsing several categories (i.e., pervasive developmental disorder – not otherwise specified [PDD-NOS], autistic disorder, Asperger’s syndrome, and childhood disintegrative disorder) into two diagnoses, ASD and social (pragmatic) communication disorder (APA, 2013; Masi et al., 2017).

Prevalence

Current global estimates suggest that 1% of the population worldwide is affected by autism (Zeidan et al., 2022). Recent Canadian estimates indicate slightly higher rates, with 1.5% of Canadians aged 5-17 years affected (Ofner et al., 2018). Autism is more frequently diagnosed in males than females, with estimates of 1 in 42 Canadian males aged 5-17 years receiving a diagnosis in comparison to 1 in 165 females (Ofner et al., 2018). The over-representation of Canadian males with an autism diagnosis is consistent with rates in other countries, with the

average sex ratio commonly reported as 4:1 males to females (Hull & Mandy, 2017). Despite it being well established that males more often receive a diagnosis than females, whether more males are in fact affected than females or whether this difference reflects a bias in current diagnostic processes has been contested (e.g., Bargiela et al., 2016; Duvekot et al., 2017; Hull & Mandy, 2017).

Associated Outcomes

In addition to the primary symptoms of the disorder, autism is associated with difficulties that impact functioning in multiple domains (e.g., academic, employment, social; APA, 2013). Despite evidence that most autistic individuals do not have an intellectual disability (Baio et al., 2018), autistic people generally have poorer post-secondary education and employment outcomes than their non-autistic peers (Anderson et al., 2018; Frank et al., 2019; Shattuck et al., 2012). Autistic people also experience high rates of physical health difficulties (e.g., seizure disorders, sleep disturbances, gastrointestinal disorders; Fortuna et al., 2016; Robinson-Shelton & Malow, 2016; Thulasi et al., 2019).

Autistic People's Mental Health

In general, co-occurring mental health conditions are more prevalent in autistic people than in the general population. Recent pooled prevalence rates of mental health conditions in autistic people are estimated to range from 4-18% (Lai et al., 2019). However, given the previously mentioned heterogeneity across the autism spectrum, rates vary considerably by factors such as age, cognitive functioning, and gender. For example, approximately 70% of autistic adolescents who also have an intellectual disability experience symptoms of a mental health condition (Leyfer et al., 2006), and 30-50% of autistic children and adolescents across the range of cognitive abilities experience at least two mental health conditions (Simonoff et al.,

2008). Mental health conditions often present in childhood and persist into adolescence (Simonoff et al., 2013), likely contributing to the higher rates of mental health conditions in autistic adults (Joshi et al., 2013).

There is little general agreement on which conditions most commonly co-occur with autism; some researchers have suggested attention-deficit/hyperactivity disorder (ADHD) co-occurs most often with autism (Brookman-Frazer et al., 2018; Lai et al., 2019), whereas others have suggested anxiety disorders and depression are most common (Lever & Geurts, 2016). Others have indicated a combination of anxiety disorders, mood disorders, and ADHD (Reaven & Wainer, 2015). In their recent systematic review and meta-analysis, Lai et al. (2019) identified eight diagnoses most reported in the literature that occur alongside autism (ADHD; anxiety disorders; sleep-wake disorders; disruptive, impulse control, and conduct disorders; depressive disorders; obsessive-compulsive disorders; bipolar disorders; and schizophrenia spectrum disorders). The presence of internalizing disorders in autistic people are particularly problematic as symptoms can negatively impact quality of life, exacerbate autism-related difficulties, interfere with multiple areas of functioning (e.g., family, school, and social), and increase risk for suicide (Keefer et al., 2018). Additionally, autistic adolescent females may be particularly vulnerable to experiencing internalizing disorders, especially during early adolescence (12-14 years of age; Oswald et al., 2016). In the last decade, emerging literature has also highlighted that eating disorders are increasingly common in autistic people.

Feeding and Eating Disorders

Feeding and eating disorders are severe disturbances in eating or eating-related behaviours that significantly impact functioning and/or health (APA, 2013). Similar to the collapsing of diagnostic categories for ASD in the *DSM-5*, categories of disorders related to

eating and feeding have also undergone substantial modifications (APA, 2013). The creation of the “feeding and eating disorders” section of the *DSM-5* modified and combined previous eating disorders categories and included four new diagnostic categories. The resulting umbrella term of feeding and eating disorders describes anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), pica, rumination disorder, avoidant/restrictive food intake disorder (ARFID), other specified feeding or eating disorder (OSFED), and unspecified feeding or eating disorder (UFED; APA, 2013). Eating disorders describe disturbances in eating or eating-related behaviours where the core psychopathology of the disorder is related to concerns over one’s shape, weight, and/or body image (APA, 2013). Conversely, feeding disorders involve disruptions in eating behaviour where it is assumed that the disturbance in eating is not related to concerns over weight, shape, or appearance.

Subthreshold Disordered Eating

Despite substantial previous revisions (APA, 2000) to better capture the heterogeneity of eating pathology, subthreshold disordered eating continues to affect a considerable proportion of individuals (Galmiche et al., 2019; Herpertz-Dahlmann, 2015; Stice et al., 2009). Subthreshold (also referred to as subclinical) disordered eating describes eating and weight related behaviours that do not meet diagnostic criteria for full-threshold eating disorders, but can still significantly impact functioning. Various approaches have been used to categorize subclinical/subthreshold eating disorders. One commonly used approach involves a hierarchical process wherein “partial-syndrome” is used to describe individuals who meet some (but not all) diagnostic criteria, whereas individuals with elevated but not clinically significant scores in criteria are labeled “sub-clinical” (Hammerle et al., 2016; Stice et al., 2009). While definitions of subthreshold eating disorders vary, researchers consistently report impairment associated with experiencing

disordered eating symptoms (Herpertz-Dahlmann, 2015; Latner et al., 2008). In fact, functional impairment related to the eating disturbance has been shown to be similar between individuals with subthreshold and full-threshold eating disorders (Stice et al., 2017). Not only do subclinical disordered eating behaviours impact functioning, but such behaviours often precede full-threshold eating disorder onset (Agras et al., 2009; Eddy et al., 2010). Taken together, while those with subclinical eating disorders do not meet all diagnostic criteria, the understanding of subclinical eating disorders is critical both clinically and from a research perspective.

Prevalence

Prevalence estimates vary widely depending on factors such as the specific disorders being investigated and methodology employed in the study. For example, in a recent review of eating disorder prevalence from 2000 to 2018, weighted mean lifetime prevalence of any eating disorder was estimated as 8.4% for women and 2.2% for men (Galmiche et al., 2019). Conversely, in another recent study using simulation modelling to estimate prevalence based on a nationally representative US sample, estimated lifetime prevalence was 19.7% for women and 14.3% for men by age 40 (Ward et al., 2019). Although estimates vary, several researchers have suggested that OSFED is the most prevalent *DSM-5* eating disorder diagnosis, followed by BED, BN, and AN (Galmiche et al., 2019; Stice et al., 2013; Ward et al., 2019). Importantly, as noted above, many individuals experience subclinical eating issues. Hammerle and colleagues (2016) estimated that partial syndrome eating disorders affected 13.2% of adolescents while subthreshold syndromes affected an additional 1.3%. Researchers have estimated that overall, approximately 20% of adolescents experience eating disorder symptoms (Stice et al., 2013; Zeiler et al., 2016).

Age

Similar to variation in prevalence across eating disorders, age of onset also differs by specific eating disorder, although the initial onset of most eating disorders is posited to be highly concentrated in adolescence and young adulthood (Ward et al., 2019). In a longitudinal study examining disordered eating in females aged 11 to 25 years, Slane and colleagues (2014) found an increase in all types of disordered eating from age 11 to 18 years. It is important to note that although age of onset for most eating disorders is late adolescence to early adulthood, disordered eating symptoms typically begins much earlier. Whereas age at onset describes the age at which an individual receives a diagnosis, the age at which disordered eating emerges can be markedly earlier due to various factors (e.g., level of impairment, diagnostic pathways, etc.).

Biological Sex

Historically, females were thought to be impacted by eating disorders significantly more than their male counterparts; however, more recent research suggests more males than previously thought may experience eating disorder symptoms, though such symptoms often present differently. In a large sample of Canadian adolescents, Flament et al. (2015) found that 2.2% of males met *DSM-5* criteria for an eating disorder with an additional 1.1% identified with a subthreshold eating disorder (compared to 4.5% and 5.1% of females with an eating disorder and subthreshold eating disorder, respectively). The increasing literature examining eating disorders in males has allowed researchers to begin to identify key differences in eating disorder presentation between males and females. For example, male youth are more likely than female youth to present with a diagnosis other than AN or BN (typically OSFED; Kinasz et al., 2016). Males and females are also thought to experience different body image concerns, with females being more likely to experience a drive for thinness whereas males are more likely to experience drive for muscularity (Baker et al., 2019). In addition to the recent increase in research on eating

disorders in males, the presence of eating disorders in transgender people has also begun to receive increased attention. Findings consistently highlight that transgender young people experience significantly higher rates of eating disorder symptoms than cisgender young people, with engagement in food restriction and/or compensatory behaviours to prevent puberty onset or progression being a common theme (Coelho et al., 2019).

Associated Outcomes

Although specific eating disorders are associated with different medical complications, regardless of disorder, individuals with eating disorders may experience poorer quality of life relative to individuals without eating disorders (Mond et al., 2012) as well as compared to individuals with other psychiatric and physical health conditions (Jenkins et al., 2011). In addition to poor quality of life, individuals with eating disorders also have significantly elevated risk of mortality (Arcelus et al., 2011; Smink et al., 2012). AN is associated with the highest rates of mortality followed by eating disorder not otherwise specified (EDNOS; *DSM-IV* diagnostic category similar to OSFED) and then BN (Arcelus et al., 2011). In AN specifically, while complications of significantly low weight and malnutrition contribute to a substantial proportion of deaths, suicide has been identified as a particularly common cause of death, with an estimated one in five deaths in individuals with AN being due to suicide (Preti et al., 2011; Smink et al., 2012). Rates of death by suicide for other eating disorders are inconclusive, but some researchers suggest that rates of suicide in individuals with BN may be like rates in AN (Preti et al., 2011). Taken together, regardless of cause of death, eating disorders are associated with high rates of mortality in addition to various adverse health outcomes which likely influence the lower quality of life commonly reported.

Mental Health of People with Eating Disorders

Eating disorders are associated with high rates of co-occurring mental health conditions (Swanson et al., 2011). Most individuals with eating disorders also experience other mental health conditions before, during the acute state of their illness, or long-term (Herpertz-Dahlmann, 2015; Swanson et al., 2011). Two of the most common co-occurring categories of mental health conditions across eating disorders are mood and anxiety disorders (Blinder et al., 2006; Herpertz-Dahlmann, 2015). Mood disorders, particularly depression, occur ubiquitously across eating disorder categories (Blinder et al., 2006), with reported estimates ranging from 10 to 60% of adolescents with AN (Salbach-Andrae et al., 2008; Swanson et al., 2011). Mood disorders have been shown to be present in 50% of adolescents with BN and 45% with BED (Swanson et al., 2011). Literature on the co-occurrence between ARFID and mood disorders is quite limited, but there is evidence to suggest individuals with ARFID are less likely than those with AN or BN to experience mood disorders such as depression but more likely to experience anxiety disorders (Fisher et al., 2014; Lieberman et al., 2019).

Body Image

Body image is a multifaceted construct that refers to how an individual subjectively evaluates their appearance (Cash & Smolak, 2011). Disturbances in body image are thought to contribute to the development and maintenance of disordered eating (Murnen & Smolak, 2019). In their seminal work, Cash and Deagle (1997) conducted a widely influential meta-analysis in which they proposed that body image is comprised of attitudinal and perceptual components. This distinction between attitudinal and perceptual body image continues to be generally accepted today (Murnen & Smolak, 2019), with many researchers also including behaviours that serve to reinforce the body image disturbance in their operationalization of body image (Delinsky & St. Germain, 2012).

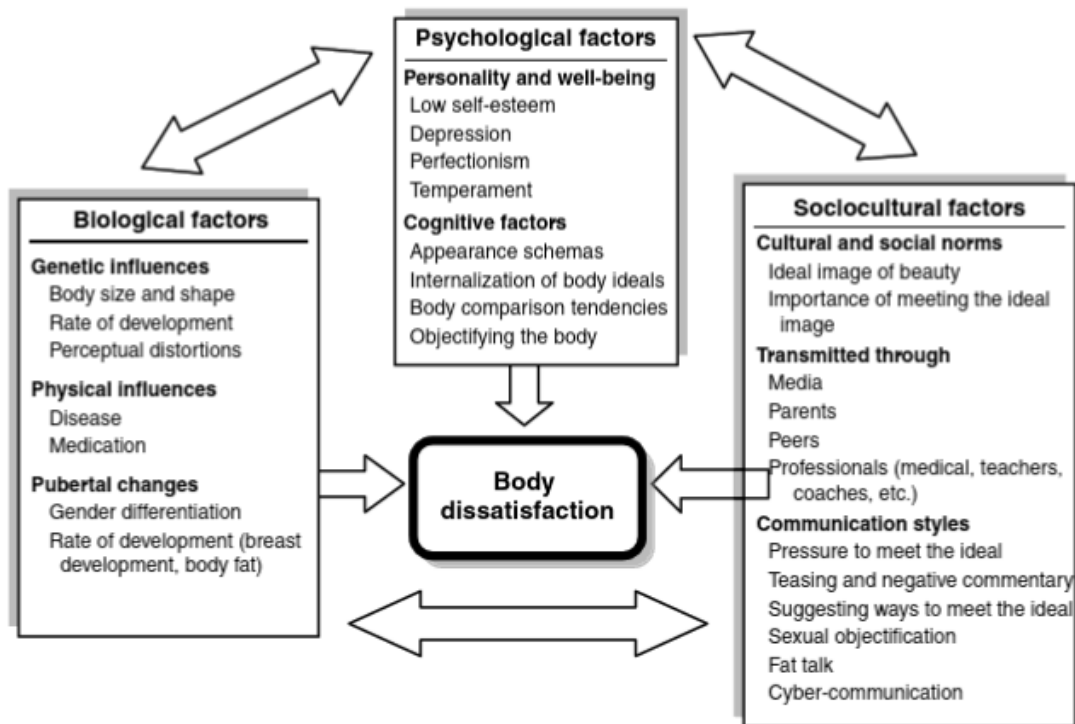
Body Image Development

An individual's body image is influenced by several factors and there is some question as to when body image development begins. Recent research suggests that sensitive periods during which body image tends to worsen may occur earlier than previously thought, around ages 10-14 years, with a general improvement in body image from age 16 to 24 years in females (Lacroix et al., 2023). Many factors have been posited to influence body image leading to the creation of comprehensive models of body image development, with most focusing primarily on the development of body dissatisfaction (Wertheim & Paxton, 2012). One widely used approach describes body image development through a biopsychosocial framework, which suggests that an individual's biological characteristics interact with sociocultural influences and psychological characteristics to shape body image. Figure 1.1 displays how the three primary types of influences (biological, sociocultural, and psychological) and associated factors potentially influence body image in adolescent females (Wertheim & Paxton, 2012). Regarding biological influences, body image disturbances may develop when an individual's body characteristics do not fit within culturally determined beauty norms that have been internalized. For example, in cultures where the beauty ideal emphasizes a slim or toned body size and shape, an individual who lives in a larger body that is incongruent with this cultural ideal may be at risk for developing body dissatisfaction (Wertheim & Paxton, 2012). There are several psychological factors that may contribute to positive or negative body image development. Individual factors such as personality and temperamental characteristics (e.g., perfectionism, low self-esteem) and thinking patterns (e.g., negative body image thinking habits) are associated with body image concerns (Verplanken & Velsvik, 2008; Wertheim & Paxton, 2012). Sociocultural factors are

substantial influences in determining an adolescent's standards of beauty and the importance they place on appearance (Wertheim & Paxton, 2012).

Figure 1.1

A Model of Factors Related to Body Image Development in Adolescent Girls



Note. Reprinted from *Body Image Development - Adolescent Girls*, by E.H. Wertheim and S.J. Paxton (2012) in T.F. Cash (Ed.) *Encyclopedia of Body Image and Human Appearance* (p. 189). Elsevier Science. Copyright (2012) by Elsevier Inc. Reprinted with permission.

The development of body image is a complex, multifaceted, and dynamic process where multiple factors must be considered together, much like the construct of body image itself. Although some factors have received relatively more research attention regarding their role in the development of body image concerns (e.g., BMI, media) few risk factors have strong and consistent support. Therefore, it is important to conceptualize body image dissatisfaction and its development from a multifaceted perspective, such as the biopsychosocial perspective.

Autism, Feeding/Eating Problems, and Body Image

Initial descriptions of autism included the presence of atypical eating patterns (Kanner, 1943). While such behaviours are no longer part of the diagnostic criteria, problems with eating continue to be extremely common in this population. Additionally, autistic traits appear to be relatively common in individuals with eating disorders. Despite the relatively high rates of apparent overlap between autistic characteristics in individuals with eating disorders, literature that examines feeding and eating issues in autistic people largely focuses on the presence of feeding disorders in children. As a result, the nature and extent of how eating disorders affect autistic people remains poorly understood and represents an important gap in the literature. Although there are several studies exploring the presence of autism characteristics in AN, few researchers have examined the inverse phenomenon (i.e., eating disorders in autistic people), leaving the field's understanding of the relation between these disorders largely one-sided. The current research aimed to fill this gap by examining the prevalence of feeding and eating problems in a sample autistic and non-autistic women and girls.

A second important gap in the research concerns autistic people's body image. As mentioned previously, very little research exists that has examined autistic people's body image. Recently, Kinnaird et al. (2019) suggested that autistic people with co-occurring AN may have unique factors motivating their eating behaviours, behaviours more related to their autistic traits rather than shape and weight concerns. Rates of autism and co-occurring eating disorders (primarily AN) are thought to be markedly higher than in the general population, yet alarmingly no research has investigated how autistic people perceive their bodies and how this is related to eating behaviours. The current research sought to address this gap by providing a multi-

dimensional description of how autistic women and girls experience body image, as well as a comparison between the experience of autistic and non-autistic women and girls.

The Intersection of Autism and Eating Disorders: Understanding Body Image and Eating Problems in Women and Girls

Study Overview

This study will be the first to investigate whether autistic women and girls differ from their non-autistic peers in the way they perceive their bodies using a multidimensional conceptualization of body image. To our knowledge, no research to date has investigated body image in autistic young people in relation to eating and weight-control behaviours. However, autistic youth and young adults may be more likely to experience mental health issues and eating disorders, making them particularly vulnerable to experiencing body image disturbances. Understanding whether autistic young women experience their bodies differently than their peers is critical to informing clinical practice on preventing and identifying body image issues early, the development of appropriate treatment strategies, and to help prevent further morbidity.

Methodology

Research Design

This study will use a comparative cross-sectional design to compare autistic women and girls to their age-matched non-autistic peers. To date, the only study examining body image in young autistic people used a sample comprised largely (96%) of autistic males (Asada et al., 2018). Given that very limited previous research has been conducted in this area and no validated measures for assessing body image in this population exist, a critical first step is to compare autistic individuals to their non-autistic peers to quantify whether differences exist. To this end,

the current study will examine differences between diagnostic groups using several body image and eating behaviour measures.

Participants

A total of 96 participants were recruited to participate in the current study. Following matching procedures (described below), data integrity checks, and data cleaning, 37 autistic participants and 37 non-autistic participants were included in the sample. Participants were required to be able to read and write in English and were required to not be in treatment or on a waitlist for treatment for an eating disorder. Recruitment targeted individuals who reported both female sex and identified as a woman; however, given that autistic people present with more diverse gender identities than their non-autistic peers (Øien et al., 2018; Pecora et al., 2020), participation was not restricted if individuals reported either female sex or that they identified as a woman. Additional participant information is provided in chapters three and four.

Instruments

In line with a multidimensional conceptualization of body image, participants completed several measures assessing various aspects of body image as well as measures of eating and weight-control behaviours. All participants completed a demographic questionnaire to obtain information regarding age, sex, gender, mental health diagnoses, and current medications. To measure the different aspects of body image, participants completed the shape and weight concern subscales from the Eating Disorder Examination Questionnaire (EDE-Q), Sixth Edition (Fairburn & Beglin, 1994), the Body Image Importance subscale of the Body Image and Body Change Questionnaire (Ricciardelli & McCabe, 2002), the Body Checking Questionnaire (BCQ; Reas et al., 2002), and the Body Image Avoidance Questionnaire (BIAQ; Rosen et al., 1991). Eating pathology was measured using the Eating Disturbances in Youth-Questionnaire (EDY-Q;

Kurz et al., 2015), the Swedish Eating Assessment for Autism Spectrum Disorders (SWEAA; Karlsson, et al., 2013), and the restraint and eating concerns subscales from the EDE-Q. Participants also completed measures of related constructs, such as social comparison and fear of negative appearance evaluation using the Physical Appearance Comparison Scale - Revised (PACS-R; Schaefer & Thompson, 2014) and the Fear of Negative Appearance Evaluation Scale (FNAES; Lundgren et al., 2003). Detailed information regarding the nature of each measure as well as respective psychometric proprieties are presented in chapters three and four.

Procedure

Approval from the University of Calgary Conjoint Faculties Research Ethics Board was obtained for this study.

Sampling Procedures. Participants for the current study were recruited through a combination of convenience and snowball sampling methods. Posters and blurbs with information on study participation were distributed to organizations and clinics across Canada and on social media (Twitter, Reddit, Facebook). Existing research projects with a pool of eligible participants who have consented to being contacted for future participation were invited to participate in the study. Additionally, participants were recruited through the University of Calgary Psychology Department's Research Participation System (RPS).

Matching. Given that adolescence and young adulthood are times of rapid physical and emotional development, groups were age-matched to address the potential confound of different stages of development between groups. Participants were individually matched based on chronological age such that each autistic participant had a non-autistic participant matched to no more than 9-months of their age.

Data Collection. Interested participants were asked to contact the researchers to express their interest and indicate that they met eligibility criteria. Once eligibility criteria were confirmed, participants were provided a Qualtrics link to complete the survey. After being prompted to read through the consent form, capacity to consent was established by answering multiple choice questions related to the study objectives and consent process (e.g., “What do the researchers want to learn?” with possible answers of (a) about autistic and non-autistic people’s body image and eating difficulties [correct answer]; (b) About the mental health experiences of people from different countries; (c) why humans have opposable thumbs). Participants were required to correctly answer 7 out of 8 capacity questions to be deemed eligible to participate in the study. After providing consent, screening questions about presence of an eating disorder were provided. If participants endorsed being in treatment for or on a waitlist for treatment of an eating disorder, they were directed to the study completion page and provided with the debriefing information. Otherwise, participants were allowed to proceed to complete the questionnaires. Participation took approximately 40 minutes and participants were welcomed to start and stop the questionnaires at their leisure. Upon completion of the questions, a list of resources to learn more about eating disorders and body image issues and a document with strategies to develop a more neutral/positive relationship with their body were displayed along with the option to download the resources. Participants were also invited to follow a link to a second, separate questionnaire to enter their email to receive a \$10 (Canadian) online gift card.

Bot Protection Measures. Given the online nature of the study, several steps were taken to ensure the validity of the responses, in line with recommendations from Storozuk and colleagues (2020). First, participants were required to contact the researchers to express their interest in the study; emails were screened, and likely bots/fraudulent emails were ignored (e.g.,

generic emails, obviously fraudulent expressions of interest). Open-ended responses and reverse scored items were examined for inconsistencies, and time and speed of survey completion was also monitored. Qualtrics' embedded Fraud Detection metrics were monitored, and participants flagged by Qualtrics metrics were reviewed. Additionally, Qualtrics' location data was reviewed to ensure this data was consistent with the participant's reported country of residence. To confirm that they were human, participants were asked to complete several simple tasks (e.g., draw a simple picture of a sun, cat, etc.). Attention check questions were also used at the approximate half-point of the questions.

Data Analysis

Data was collected using Qualtrics and analyzed using SPSS Version 28. Variables were examined through various SPSS functions to check data accuracy, missing values, and assumptions for statistical analysis. Univariate and multivariate techniques were used as part of this study. In Chapter 3, a MANOVA and independent samples t-tests were used to examine group differences between the autistic group and non-autistic group on various aspects of body image. In Chapter 4, a series of independent samples t-tests were conducted to examine differences between groups on measures of eating problems. As well, correlational analyses were conducted to examine the relation between multiple aspects of eating problems and body image. A description of analyses specific to each research question can be found in Chapters 3 and 4.

Conclusion

Results of this study build on the extremely limited research in this area. Despite the higher-than-expected prevalence of eating problems in autistic young people, very little is known about their experience of body image. Findings from this work have the potential to inform

clinical practice in the assessment, prevention, and treatment of body image problems and eating issues in autistic young people.

Overview of Manuscript-Based Thesis

Chapter 1 has provided a broad overview of relevant study constructs and reviewed the literature in this area. Four additional chapters, including three manuscripts, comprise the remainder of this thesis. Chapter 2 presents a published scoping review of feeding and eating problems in autistic young people (*Autism: the international journal of research and practice*). Chapter 3 includes a manuscript prepared for submission to an autism-focused journal (e.g., *Autism, Autism Research, Research in Autism Spectrum Disorders*) which examines how autistic women and girls experience body image compared to their non-autistic peers. Chapter 4 also includes a manuscript prepared for submission to an autism-focused journal (e.g., *Autism Research, Research in Autism Spectrum Disorders, Autism in Adulthood*). This third manuscript extends the findings from Chapter 3 by first examining the prevalence of different eating and feeding problems in the sample and then examining the relation between body image and feeding/eating problems. Finally, Chapter 5 integrates findings from the three manuscripts and provides a general discussion as well as limitations and directions for future research.

**CHAPTER TWO: Feeding and Eating Problems in Children and Adolescents with Autism:
A Scoping Review**

Chapter Overview

This chapter presents a scoping review of feeding and eating problems in autistic young people. A wide range of issues related to feeding, eating, and mealtime behaviours have been examined in autistic populations, with little consistency across studies. The manuscript presented here aimed to comprehensively describe the nature and extent of feeding and eating problems and to identify characteristics that influence the presentation of feeding and eating problems in autistic youth. The full citation for this work is:

Baraskewich, J., von Ranson, K. M., McCrimmon, A., & McMorris, C. A. (2021). Feeding and eating problems in children and adolescents with autism: A scoping review. *Autism: the international journal of research and practice*, 25(6), 1505–1519.

Abstract

Feeding problems, such as picky eating and food avoidance, are common in youth with autism. Other feeding and eating problems (e.g., disordered eating, fear of trying new foods, and insistence on specific food presentation) are also common in this population. This scoping review describes the nature and extent of feeding and eating problems in autistic youth and reports characteristics of autistic youth who experience such issues. Thirty-four studies were included in the current review, with almost all studies (91%) investigating feeding problems. Only 9% of studies examined concern with weight, shape, and/or body image, but several authors noted that disordered eating attitudes and behaviors may occur more frequently in those with autism than their peers without autism. No common individual characteristics (e.g., cognitive functioning and autism symptom severity) were identified for youth who experience feeding or eating problems. Although differentiating “feeding” from “eating” problems is critical for accurate identification and treatment of these issues, the existing literature has failed to do so. We propose that in future research “eating problems” be used when behaviors involve preoccupation with food, eating, or body image, and “feeding problems” be used when such preoccupation is absent.

Lay abstract

Feeding problems, such as picky eating and food avoidance, are common in youth with autism. Other, broader difficulties with feeding and eating (eating disorder symptoms such as restricting food intake or preoccupation with body shape or weight and insistence on specific food presentation) are also common in autistic individuals. Here, we describe the nature and extent of feeding and eating problems in youth with autism. We found no common characteristics (such as severity of autism symptoms) that best describe autistic youth who experience problems with

feeding or eating. Almost all studies we reviewed focused on problems with feeding (selective or picky eating), and only a few studies focused on eating disorder symptoms (concern with weight, shape, and/or body image). However, some researchers reported that eating disorder symptoms may occur more often in autistic individuals compared to their peers without autism. Many studies used the terms “feeding” and “eating” problems interchangeably, but understanding the difference between these problems is important for researchers to be consistent, as well as for proper identification and treatment. We suggest future researchers use “eating problems” when behaviors involve preoccupation with food, eating, or body image, and “feeding problems” when this preoccupation is absent. We highlight the importance of understanding whether feeding or eating problems are separate from autism traits, and the role of caregivers and other adults in the child’s treatment. Considerations for health-care providers to assist with diagnosis and treatment are also provided.

Manuscript

Autism¹ is a neurodevelopmental condition characterized by social communication deficits and restricted, repetitive patterns of behaviour or interests (American Psychiatric Association [APA], 2013). Feeding and eating problems are pervasive problems that affect persons with autism across all ages and cognitive abilities (Råstam, 2008; Vissoker et al., 2015). For example, in their sample of 1,462 youth, Mayes and Zickgraf (2019) found atypical eating behaviours (e.g., limited food preferences, brand-specific preferences) occur much more often in autistic children (70.4%) compared to children with other disorders (13.1%) and children in the general population (4.8%). When issues such as mealtime behaviours, fear of trying new foods, and eating problems associated with medical disorders (e.g., gastrointestinal disorders) are considered, rates of eating and feeding problems in autistic youth are likely even higher. Such high rates of varied eating and feeding problems suggest the difficulties related to eating that autistic youth experience may be complex, pervasive, and heterogeneous in nature.

Despite the heterogeneity of these problems, the most recent version of *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; APA, 2013)* combined problems related to feeding and eating into one comprehensive chapter, highlighting similarities between the two types of disorders. Eating disorders involve persistent disturbances in eating or eating-related behaviours that significantly impair health or functioning, and often involve overconcern with weight, shape, and/or body image disturbance (APA, 2013). To date, no formal definition for feeding disorders has been established (Kennedy et al., 2018); however, a commonly

¹ This paper uses the terms *autistic* and youth *with autism* interchangeably, to acknowledge and respect both person-first and identity-first language.

accepted definition is “Severe disruptions in nutritional and caloric intake exceeding ordinary variations in hunger, food preference, and/or interest in eating” (Sharp et al., 2017, p. 116). This definition assumes that the disturbance in eating is unrelated to concerns with weight, shape, or appearance in feeding disorders. Although abnormal feeding or eating behaviours are symptoms of feeding and eating disorders (Claudino et al., 2019), a key difference between the two categories of disorders involves the individual’s cognitive appraisal of their appearance or body image concerns. Specifically, eating disorders involve varying degrees of preoccupation with food, body weight, and/or shape, whereas in feeding disorders, the motivation may be a combination of other reasons (e.g., negative previous feeding experiences, pain/discomfort with feeding, low muscle tone; Claudino et al., 2019; Kennedy et al., 2018) rather than cognitive concerns related to the effects of food on appearance or body image concerns.

Eating and Feeding Disorders

Anorexia nervosa (AN) is an increasingly common eating disorder in which individuals limit their food intake, have a marked fear of gaining weight, and their body weight and/or shape excessively influences their self-evaluation (APA, 2013). Another eating disorder associated with concern over weight/shape is bulimia nervosa (BN), which has core symptoms of repeated episodes of binge eating (i.e., eating in a 2-hour period a distinctly larger amount of food than what most individuals would eat in a similar time period and context, together with a sense of loss of control over eating) followed by purging or inappropriate compensatory behaviours to prevent weight gain (e.g., self-induced vomiting, laxative misuse, excessive exercise; APA, 2013). A third, common eating disorder is binge eating disorder (BED), which has core diagnostic features of repeated episodes of binge eating accompanied by feelings of distress (APA, 2013).

A common eating concern that most children experience at some point during childhood is picky eating (Mascola et al., 2010). There is little consensus on precisely what defines picky eating, but the most accepted definition describes a reluctance to eat familiar foods or try new foods, which interferes with daily functioning and adversely impacts the child and their caregivers, as well as the parent-child relationship (Lemung, 2005). Picky eating is often used colloquially to refer to selective food intake (Kral et al., 2013), or eating an inadequate variety of foods that can occur for many reasons, such as sensory sensitivity (based on food texture or colour, for example), limited food preferences, or neophobia (fear of trying new foods). Although picky eating and selective eating are not formal diagnoses, the *DSM-5* (APA, 2013) introduced a disorder that resembles a persistent, extreme version of picky eating, avoidant/restrictive food intake disorder (ARFID). This disorder is characterized by avoidance of certain foods, resulting in a limited repertoire of foods an individual will eat, and/or restricted food intake leading to nutritional or energy deficits (APA, 2013). Whether ARFID best represents an eating disorder or a feeding disorder has been contested, as symptoms share characteristics with both. For example, similar to feeding disorders, ARFID can only be diagnosed in the absence of weight or shape concerns; however, symptoms such as rigid rules around food and low weight mirror what is commonly seen in AN, highlighting its similarity to eating disorders (Kennedy et al., 2018).

Finally, the *DSM-5* (APA, 2013) outlines two feeding disorders, pica and rumination disorder, about which little is known, but both disorders are thought to be over-represented in persons with autism (Chial et al., 2003; Matson et al., 2011; Råstam, 2008). Pica is characterized by persistent eating of non-nutritive, non-food substances that is not part of cultural or social normative practices (APA, 2013). A diagnosis of rumination disorder applies when an individual

repeatedly regurgitates food (i.e., food is swallowed and then brought up into the mouth and either re-chewed and ejected or re-swallowed), without attribution to an associated gastrointestinal or other medical condition (APA, 2013).

Feeding and Eating Problems in Persons with Autism

Research on eating behaviours in persons with autism is relatively limited (Råstam, 2008) and existing literature has focused on a broad range of difficulties, including feeding problems, mealtime behaviours, and picky eating. Most literature to date examining eating disorders in persons with autism has been conducted predominately with adults, whereas picky eating and feeding disorders have been investigated in children and youth. Feeding or eating problems commonly present early in development, often even before concerns related to autism are identified (Emond et al., 2010). Without treatment, the feeding problems autistic children experience tend to persist into late childhood (Suarez et al., 2014); however, to our knowledge, no studies have examined whether these feeding problems precede eating problems in autistic youth.

Recently, increased attention has been directed at the overlap of autism and eating disorders, with particular emphasis on AN (e.g., Karjalainen et al., 2019; Kinnaird et al., 2019; Westwood & Tchanturia, 2017). Westwood and colleagues (2018) found an overrepresentation of autism symptoms in adolescent females with severe AN, with 10% of their sample meeting full criteria for autism and an additional 40% who were below cut-off but presented with symptoms. Most literature to date has examined the presence of autism symptoms in individuals with AN, and few studies have examined the reverse relation.

Having a neurodevelopmental condition such as autism may increase the likelihood of developing eating problems, though this relation is poorly understood (Mayes et al., 2018).

Several mechanisms may explain this association. For example, cognitive inflexibility might manifest as rigid rules around food and a preoccupation with eating that may develop into disordered eating with similar characteristics of rigidity and an obsession with food/eating such as AN (APA, 2013). Alternatively, there may be a shared underlying genetic vulnerability that interacts with environmental factors to manifest as disordered eating, or shared underlying difficulties in cognitive, social, and/or emotional functioning (Davies et al., 2016; Oldershaw et al., 2011). Recently, Brede et al. (2020) proposed a model of autism-specific traits that may influence the development and maintenance of restrictive eating problems. These traits included sensory sensitivities, social interaction and relationship difficulties, sense of self and identity issues, difficulties with emotions, autistic thinking styles, and a need for control and predictability that may interact to influence a variety of restrictive eating presentations directly and indirectly.

Based on the field's limited understanding of eating problems in autism, eating problems are likely often misattributed to the individual's autism traits (Mayes et al., 2018). For example, the restriction of food intake, a primary symptom of AN, can be misattributed as a sensory aversion. Although eating problems may be secondary to an autism diagnosis, no consensus has been established for how to assess for eating problems in this population. Similarly, there is a limited understanding as to whether such problems should be attributed to an individual's autism or whether an additional diagnosis is warranted. Likewise, psychotherapeutic treatment options that adequately address an autistic person's eating problems are extremely limited.

Current Review

The purpose of this review is to comprehensively describe the nature and extent of feeding and eating problems in youth with autism. The aims of the present paper are to: (a)

summarize commonly investigated feeding and eating problems as well as quantify the percentage of studies that assess weight, shape, and/or body image concerns in youth with autism, and (b) identify characteristics that may influence the prevalence and/or presentation of feeding and eating problems. Implications for diagnosis and treatment of feeding and eating problems in autistic individuals are discussed.

Methods

Search Strategy and Selection Criteria

A systematic literature search was conducted in MEDLINE, PsycINFO, and PubMed databases using relevant controlled vocabulary and key terms (see Table 2.1). The review was conducted and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher et al., 2009), as seen in Figure 2.1. Publication dates were not restricted to ensure all possibly relevant articles were included up until April 2020. All searches were restricted to articles written in English, conducted with human participants, and published in peer-reviewed journals. The systematic search was accompanied by a manual examination of reference lists from retained articles.

Table 2.1

Search Terms

Population terms	autism spectrum disorders OR pervasive developmental disorder OR PDD* OR asperg* OR autis*
Age terms	child* OR infant* OR adolescen* OR pediater* OR youth*
Feeding and eating problems terms	Feeding and eating disorders OR feeding behaviour OR 'eating issue' OR 'eating problem' OR 'picky eating' OR eating behavior* OR eating disorders or body image

PDD: pervasive developmental disorder.

*denotes wildcard search terms

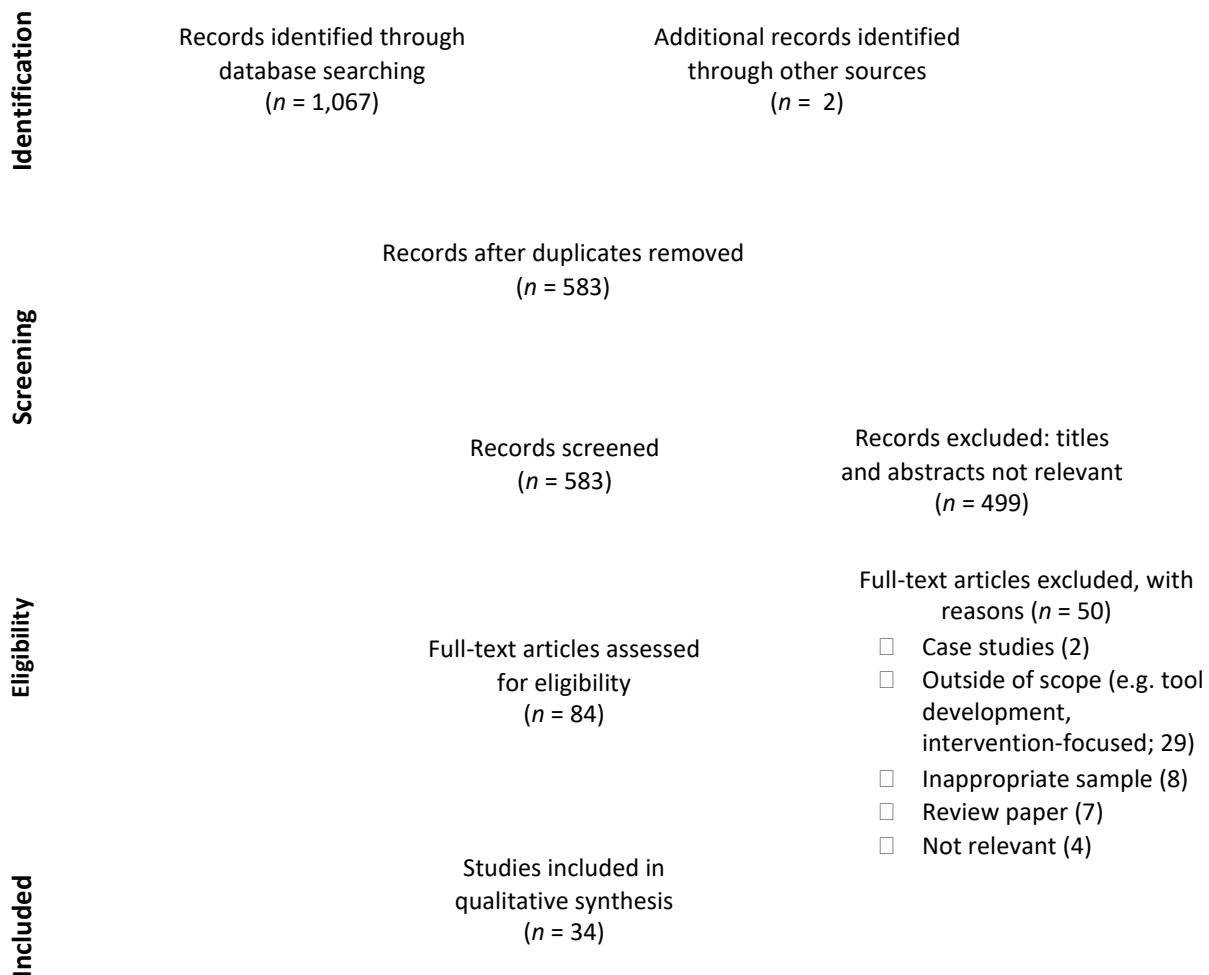
To be included, articles had to contain empirical research with a focus on feeding and/or eating problems, not exclusively medical-related issues (e.g., studies primarily focusing on nutrient deficiencies, genetic markers, and parental feeding practices). To meet these criteria, articles had to include an objective measure of feeding or eating problems. Studies were also required to analyze and present data from persons with autism (or equivalent diagnoses such as pervasive developmental disorder not otherwise specified [PDD-NOS] or Asperger syndrome) separately. Samples had to focus on children or adolescents aged 18 years or under; however, in line with previous reviews of mental health issues in persons with autism (e.g., Cassidy et al., 2018), studies were included if 50% or more of the total sample was under 18 years, to maximize the number included. Studies that examined feeding and eating problems in the context of other medical conditions (e.g., gastrointestinal disorders, epilepsy) were excluded to provide a homogeneous evidence base. Studies examining interventions for specific behaviours (e.g., swallowing, number of bites accepted), case studies, and tools developed to address feeding and eating problems were also excluded to allow for better generalizability of the findings.

Community Involvement

Community service providers who specialize in treating feeding and eating disorders were consulted in the development of the broad aims of the current paper. After the search was completed, findings were presented to service providers and feedback from this consultation was incorporated into our discussion.

Figure 2.2

PRISMA Diagram Results (from Moher et al., 2009).



Results

We included 34 studies in our review, with 22 studies appearing to use original datasets and 12 reporting secondary data analysis. The total sample of participants with autism was 4,215. Participants were recruited from a variety of sources (e.g., community organizations, autism service organizations, specialized clinics). Most studies (59%) were conducted in the USA, with some completed in Australia (9%), as well as Italy, England, and Canada (6% each). The earliest study was published in 2004 and over half (56%) were published from 2013-2017. Participant

age ranged from 2 to 28 years, although the majority focused on children eight years of age or younger. Most studies (88%) relied on parent-reported data; a small number (9%) combined parent- and self-report, and a single study (3%) relied solely on observational data. Nearly all studies (88%) used a cross-sectional design, though some (12%) collected data across multiple time-points. Table 2.2 presents sample characteristics and relevant findings of included studies.

Conceptualization of Feeding and Eating Problems

Most often, the terms “feeding” and “eating” problems were used interchangeably to describe a number of related issues. Some studies used the term “feeding problems” to describe a range of problematic behaviours that occur in the mealtime context (e.g., Aponte & Romanczyk, 2015; Johnson et al., 2014) whereas others referred to such issues as “eating problems” (e.g., Kerwin et al., 2005). Others used the term “eating problems” to describe pathology related to restricted eating (i.e., failing to gain weight and perceived fear of gaining weight; Råstam et al., 2013). In contrast to the framework for distinguishing feeding and eating problems in this review (where the differentiating factor is the presence or absence of cognitive concerns related to weight, shape, and/or body image), no clear differentiation was presented in the literature.

Commonly Investigated Feeding and Eating Problems

Weight, Shape, and Body Image Concerns. A primary objective of our review was to identify commonly investigated feeding and eating problems in youth with autism. A secondary, related objective was to understand how studies differentiated between feeding and eating problems by identifying the proportion of studies that measured the presence of eating disorder symptomology (defined as the presence of cognitive concerns related to weight, shape, and/or body image). Ninety-one percent of included studies examined “feeding” rather than “eating” problems. Only three studies (9%) examined constructs that fit our definition of eating problems.

Specifically, Bitsika and Sharpley (2018) found approximately 11% of 52 young females with autism endorsed severe eating disturbances (i.e., purging, dieting, and fasting behaviours). These authors concluded that eating disturbances do not represent a common comorbidity in young autistic females. In contrast, other researchers reported that eating problems are over-represented in individuals with autism compared to the general population. For example, Kalyva (2009) found adolescent females with Asperger syndrome were at a significantly higher risk for eating problems compared to age- and BMI-matched peers without Asperger syndrome. Specifically, participants with Asperger syndrome self-reported significantly more BN symptoms, food preoccupation, oral control, and overall eating problems. The same differences between groups were seen in parent-reported eating problems, but mothers of adolescents with Asperger syndrome also indicated their daughters had significantly more dieting behaviours. Similarly, in a large population-based study, Råstam and colleagues (2013) found the prevalence of restrictive eating problems (consistent with a diagnosis of AN) was significantly higher for children (aged 9 and 12 years) with ADHD and/or autism, with the highest rates seen in girls with co-occurring ADHD and autism. Taken together, although the proportion of studies examining eating problems in autistic youth is small, preliminary evidence suggests persons with autism may be at higher risk for developing eating problems compared to persons without autism.

Feeding Problems. Eighty-six percent of studies investigated feeding problems involving selective intake. A few studies reported no or marginal differences in food selectivity between youth with autism and controls. For example, although Castro and colleagues (2016) found autistic youth (aged 4-16 years) differed from matched general population controls on overall levels of problematic eating behaviour, groups did not significantly differ in their picky eating symptoms. Similarly, autistic children aged 2-12 years were only marginally more likely

to exhibit picky eating behaviour when compared to age- and gender-matched siblings and children without autism (Martins et al., 2008). However, most studies reported greater food selectivity in autism groups. For instance, Mayes and Zickgraf (2019) found atypical eating behaviours (e.g., limited food preferences, texture sensitivity, brand specific preferences) were five times more common in youth with autism than children with other disorders (e.g., ADHD, intellectual disability, language disorder, learning disability) and 15 times more common in the autism group than their typical developing peers, with limited food preferences being the most common atypical eating behaviour. Matson et al. (2009) found autistic youth showed significantly higher rates of feeding problems compared to typically and atypically developing groups (i.e., developmental disability other than autism), especially with food selectivity. In general, most studies that compared groups of youth with autism to groups with other disorders and/or typical development found autistic individuals had higher rates of food selectivity. In the studies without comparison groups, rates of food selectivity in samples of autistic youth were strikingly high (e.g., 62% showed food selectivity in Kerwin et al., 2005; 72% showed restricted variety and 57% showed food refusal in Schreck & Williams, 2006).

Four studies examined patterns of food selectivity across time and produced mixed results. Beighley and colleagues (2013) found a general trend of decreased food selectivity as children with autism got older, but the same trend was not observed in children and adolescents without autism. Interestingly, Bandini et al. (2017) examined food selectivity in youth with autism at two time-points approximately six years apart. They found that while food refusal improved over time, the number of foods eaten did not increase, suggesting that the decrease in overall selectivity may be better attributed to a decrease in caregivers offering non-preferred foods (Bandini et al., 2017). Similarly, Suarez and colleagues (2014) found no change in food

selectivity in children with autism over a two-year period. In perhaps the most comprehensive study of trajectories of feeding problems, Peverill et al. (2019) characterized feeding patterns of 396 preschoolers with autism across four time-points up to age six. Four trajectories of feeding problems were found: less severe and stable (26%), moderate and declining (39%), severe and declining (27%), and very severe and stable (8%). Authors concluded that, like general population children, most feeding problems remitted over time, though a small group of preschoolers with autism continued to show chronic feeding problems into school age. Together, results of the four studies examining selective eating over time suggest variability in patterns of selective eating. The trajectory of selective eating is likely heterogeneous and complicated by other feeding/eating problems the child may be experiencing, including general mealtime behaviours and rituals around eating.

Selective Eating and Sensory Sensitivity. Of the 29 studies that investigated selective eating, 69% ($n = 20$) also examined the presence of sensory sensitivities or aspects of food texture, temperature, smell, or taste in relation to food selectivity. Most ($n = 15$) examining sensory sensitivity and limited food intake utilized a broad measure of sensitivity (i.e., overall sensory impairment score or more focused but representative score, such as overall oral sensitivity). In general, these studies suggested food selectivity may be related to sensory impairments, though two (Aponte & Romanczyk, 2016; Schreck & Williams, 2006) found no relation between food selectivity and sensory impairments.

Five studies characterized specific aspects of sensory processing and produced comparable results. In survey-based studies, researchers found that food textures are the primary reason for food refusal in autistic youth (Hubbard et al., 2014; Mayes & Zickgraf, 2019; Nadon et al., 2011). Specifically, smooth creamy textures, (e.g., mashed potatoes), foods that require

chewing (e.g., unprocessed meat), and foods with lumps (e.g., oatmeal) were identified as problematic (Mayes & Zickgraf, 2019). Food selectivity was also linked to more than one sensory factor (Postorino et al., 2015), with taste and colour identified as influential (Hubbard et al., 2014; Nadon et al., 2011; Postorino et al., 2015). Laboratory mealtime observations demonstrated similar findings. Sharp and colleagues (2013) found approximately half their sample of autistic children aged 3 to 8 years demonstrated selective patterns of eating by type and/or texture. Specifically, smoother, consistent textures (e.g., hotdogs) were more likely to be accepted than lumpy/inconsistent textures (e.g., pureed beans). Together, studies that employed more rigorous measures of sensory sensitivity suggest an association between sensory sensitivity and food selectivity, with food texture representing a strong contributing factor.

Rituals and Idiosyncratic Eating Behaviours. Six studies support a relation between ritualistic behaviours and food selectivity. Several studies found youth with autism had more ritualistic and/or idiosyncratic eating behaviours (e.g., requiring specific presentation of food, use of certain utensils) than youth with other disabilities (e.g., ADHD, intellectual disability, language disorder; Mayes & Zickgraf, 2019; Williams et al., 2005), and general population peers (Diolordi et al., 2014; Mayes & Zickgraf, 2019; Williams et al., 2005). Specific presentation of food was identified repeatedly as the most common eating ritual (Diolordi et al., 2014; Schreck & Williams, 2006; Williams et al., 2005). Postorino and colleagues (2015) found nearly 13% of autistic children refused food because of brand or packaging, while nearly 4% had unspecified eating rituals. Although Martins et al. (2008) found no difference in eating rituals between autistic children and their siblings without autism, they found greater sensory impairment was associated with more ritualistic eating behaviours which, as outlined above, has strong associations with food selectivity.

Pica. Four studies examined symptoms of pica in youth with autism. Emond and colleagues (2010) found autistic children were markedly more likely than controls to show pica behaviour at 38 and 54 months old. Similar results were found in an older sample, where those with autism had significantly higher rates of eating unspecified non-food items (Matson et al., 2009). Mayes and Zickgraf (2019) also found relatively high rates of pica, with nearly 12% of their large sample of autistic youth showing pica symptoms vs. none in comparison groups. Finally, Kerwin and colleagues (2005) found almost 30% of their sample of autistic children had symptoms of pica. While results suggest pica may occur at higher rates in youth with autism compared to their peers, it should be noted that most of these studies did not use standardized measures to assess for symptoms of pica. For instance, two studies (Emond et al., 2010; Kerwin et al., 2005) used author-created measures to assess feeding behaviours while Mayes and Zickgraf (2019) used a validated measure along with additional qualitative information to characterize the feeding problems (e.g., inedible substances consumed).

Characteristics of Persons with Autism and Feeding or Eating Problems

A second objective of this review was to identify characteristics that may influence the prevalence and/or presentation of feeding and eating problems. Specifically, we sought to identify clinical characteristics, including cognitive functioning (IQ), adaptive functioning, and autism traits, to understand factors associated with the presence of feeding and eating problems in autism.

Cognitive Functioning. Although most studies included a measure of cognitive functioning within their protocols, only four studies examined the relation between feeding/eating problems and cognitive functioning. Of these four studies, just one (Postorino et al., 2015) reported a significant association between IQ and feeding problems, where lower IQ

was related to higher levels of food selectivity. Conversely, Mayes and Zickgraf (2019) found that autistic youth with and without an intellectual disability did not differ in their rates of atypical eating behaviours. Similarly, others found no differences in feeding or eating problems based on IQ (Bitsika & Sharpley, 2018; Johnson et al., 2014). Of note, only Bitsika and Sharpley (2018) restricted their sample to adolescents with higher cognitive abilities ($IQ \geq 70$), although Johnson et al. (2014) reported 63% of their sample had an IQ of ≥ 70 and Mayes and Zickgraf (2019) reported 70% of their sample had an IQ of ≥ 80 .

Adaptive Functioning. Similarly mixed results were found in the studies examining the relation between feeding and eating problems and adaptive functioning ($n = 4$). Kuschner and colleagues (2015) found that in a sample of adolescents and young adults with autism, those with food neophobia received significantly lower parent ratings of daily living skills, but scores of social and communication skills did not significantly differ from their peers with autism and without food neophobia. Conversely, the remaining three studies had younger participants (aged 2-12 years) and found no significant relation between feeding and eating problems and measures of adaptive functioning (Martins et al., 2008; Peverill et al., 2019; Postorino et al., 2015).

Autism Traits. Finally, one-third of studies ($n = 12$) examined feeding or eating problems and autism traits, with split results. Three studies using the ADOS-2 as an autism symptom severity score found no significant associations between feeding or eating behaviours and more autism symptoms (Bitsika & Sharpley, 2018; Johnson et al., 2014; Peverill et al., 2019). Likewise, three other studies found autism symptom severity was not significantly related to feeding or eating problems (Schreck & Williams, 2006; Sharp et al., 2013; Suarez et al., 2017). However, Postorino and colleagues (2015) used several measures to assess autism symptom severity and found those with food selectivity scored significantly higher on the Social

Responsiveness Scale (Constantino, 2005) and Social Communication Questionnaire (Rutter et al., 2003). Findings from several other studies also provided support that higher overall scores on measures of autism symptoms (Aponte & Romanczyk, 2016; Schreck et al., 2004; Wallace et al., 2018), as well as specific autism traits such as difficulty adapting to change (Martins et al., 2008) and restrictive and repetitive behaviours (Suarez et al., 2014), are significantly associated with higher levels of feeding and eating problems.

Discussion

Although the relation of autism to feeding and eating problems is not fully understood, extant literature suggests that such problems affect a substantial number of persons with autism. Consistent with previous reports (e.g., Twachtman-Reilly et al., 2008), the present review identified food selectivity as the most common feeding issue autistic youth experience. Many children without autism demonstrate food selectivity; however, such problems are typically transient and, to some extent, considered developmentally appropriate (Samuel et al., 2018). Given that most research in this area has used cross-sectional designs, factors that influence the development and maintenance of feeding and eating problems are unknown. Longitudinal research is greatly needed to improve knowledge about the comorbidity of feeding and eating symptoms with autism. It is possible that developmentally appropriate issues with feeding are amplified in youth with autism (e.g., because of sensitivity to textures), making it difficult to determine when behaviour is developmentally appropriate and when more serious pathology is present. Further, while the problem of inconsistent nomenclature is also present in the general population literature, the unclear boundary between feeding and eating problems further complicates the identification of such problems in youth with autism and likely puts individuals at risk for diagnostic overshadowing (i.e., where symptoms are misattributed to a person's autism

diagnosis when a co-occurring problem is present). Consistent nomenclature and definitions need to be established to ensure studies are measuring the same constructs and to begin to develop a framework to discern when feeding behaviours transition from developmentally appropriate to representing an underlying pathology. Therefore, similar to the distinction between feeding disorders and eating disorders made in this paper, we propose that “feeding problems” be used to refer to eating-related behaviours and/or symptoms of feeding disorders that are unrelated to weight, shape, and/or body image concerns, yet impair functioning. Conversely, we propose that “eating problems” be reserved to describe disturbances in eating-related behaviours accompanied by preoccupation with food, eating, and/or body weight or shape that impair functioning. A similar argument has been made with respect to whether ARFID best represents a feeding or eating disorder (Kennedy et al., 2018; Sharp & Stubbs, 2019). Using the term “problems” is intended to reflect the full spectrum of feeding or eating disorder symptoms rather than the term “disorder,” for which all criteria must be met. Problems with food selectivity, food neophobia, and ARFID exist at the crossroads of feeding and eating disorders (Sharp & Stubbs, 2019); however, such problems are also at the intersection of autism symptoms, emphasizing the importance of future research examining the distinction between feeding and eating problems in this population.

Another issue identified in the current review that spans feeding and eating disorders is eating rituals commonly experienced by autistic individuals. While such rituals may be related to characteristics of autism, the overlap of these problems further supports the need for more research that examines autism and eating disorders more broadly. Our finding that only three studies have examined cognitive concerns related to weight, shape, and/or body image in youth with autism highlights the paucity of research in this area. Although only a small proportion of

studies included examined eating problems, results suggest that youth with autism may be at higher risk for developing disordered eating than their peers. Our results are bolstered by rapidly accumulating research suggesting a potential overlap between autism and AN in adults (e.g., Karjalainen et al., 2019; Westwood et al., 2018; Westwood & Tchanturia, 2017 provide a comprehensive review in adults). While some evidence suggests that disordered eating behaviours are present in youth with autism, research on body image in relation to disordered eating in this population is non-existent, despite body image disturbance being an important feature of AN and BN (APA, 2013). Research on body image in this population is critical to understanding the overlap between these issues and has important implications for the identification and treatment of eating disorders in this population. That is, understanding how persons with autism perceive their body and whether they endorse cognitive concerns related to weight and/or shape is essential for the differentiation of feeding disorders from eating disorders (e.g., AN from ARFID), which has important implications for treatment, as described below.

Our second major aim sought to identify characteristics of youth with autism and feeding or eating problems with a focus on cognitive functioning, adaptive functioning, and autism traits. Of the few studies that reported mean scores of cognitive functioning, there was marked variability across samples, meaning results cannot be directly compared. Additionally, most participants from studies that reported cognitive ability had IQs of 70 or higher, so results may not extend to individuals with lower cognitive functioning. Similarly, few studies included scores from measures of adaptive functioning and autism symptom severity in their analyses. Although only a handful of studies examined the relation between adaptive functioning and feeding or eating problems, the one study (Kuschner et al., 2015) that provided support for a negative relation (i.e., poor adaptive functioning skills associated with more feeding issues) had a much

older sample than the others. This specific result suggests it is possible that food selectivity problems are only reflected in adaptive functioning scores as children with autism get older. While many more studies reported scores from measures of autism traits in relation to feeding or eating problems, results across studies were evenly split between evidence for and against an association. These variable findings are likely in part attributable to sample differences (e.g., differing age ranges, diagnoses such as ASD vs. PDD-NOS) as well as the various measures used to assess symptoms, which have differing levels of psychometric evidence.

Future research should aim to use gold-standard assessment measures (where they exist) to understand the relation between individual characteristics and feeding or eating problems in persons with autism, which would better allow for direct comparison across studies. In addition to understanding how cognitive functioning, adaptive functioning, and severity of autism traits may impact feeding and eating problems, more research is needed to understand broader differences between those who experience feeding vs. eating problems. For instance, understanding whether verbal abilities, social awareness, and/or theory of mind affect the presentation or development of feeding vs. eating problems, as well as clarifying if feeding problems precede eating problems in this population.

Clinical Implications

Although there is still much to understand in this area, results from this review have important implications for health care professionals providing diagnoses and support. To identify feeding and eating problems in youth with autism, careful, nuanced investigation is critical. While diagnostic parsimony is important, a thorough evaluation must be conducted to determine whether behaviour represents distinct eating or feeding pathology before attributing symptoms to a person's autism diagnosis. An additional diagnosis may not necessarily be warranted, but

gathering a comprehensive understanding of the child's feeding or eating problems will allow health professionals to determine the most appropriate treatment.

A recently developed, freely-available measure that may prove helpful for assessment and treatment planning of feeding and eating problems is the Pica, ARFID, and Rumination Disorder Interview (PARDI; Bryant-Waugh et al., 2019). This multi-informant, semi-structured interview considers different rationales for food restriction (e.g., sensory sensitivity, lack of interest in eating, fear of negative consequences), which can be used to guide appropriate treatment approaches. Although the PARDI has not yet been used in samples of youth with autism, it appears promising for use in this population based on the content and structure of the measure. Future research should assess the psychometric properties of the PARDI among autistic youth.

Differentiating feeding problems from disordered eating is critical for effective treatment of symptoms. Behaviourally-based interventions, including cognitive behavioural techniques, have been shown to effectively treat youth with food selectivity (Dumont et al., 2019; Lukens & Silverman, 2014), whereas family-based treatment (FBT), previously known as Maudsley family therapy, has accumulated the most evidence of efficacy for adolescents with eating disorders such as AN or BN (Lock, 2015). Limited research exists on the efficacy of treatments for youth with co-occurring autism and feeding or eating disorders; however, the presence of autism has been suggested to contribute to the resistance to conventional therapies (Wallier et al., 2009). Additionally, to our knowledge, no eating disorder treatments modified for autistic youth currently exist. Regardless of the modality used, given the heterogeneity of issues autistic youth experience, treatment protocols should consider the person's autism and eating- or feeding-specific needs to improve outcomes.

As children age, increased emphasis is placed on eating within a broader social context (e.g., eating with friends or peers; Stok et al., 2015). In light of some of the common feeding and eating problems identified within the current review (e.g., eating rituals, selective intake), some youth may require support to manage social difficulties related to their autism symptoms and their feeding or eating problems. Consequently, educators and school psychologists can play an important role in assisting youth to manage the social context of eating/feeding at school by helping mitigate related stressors. Recently, Folta et al. (2020) found that many autistic youth reported a range of strategies to cope with feeding problems in the social context, leading authors to suggest that support should involve a responsive approach that incorporates skills youth have developed to navigate eating in social situations. Lastly, it is important to consider the role of caregivers in the treatment of feeding or eating problems in autistic youth. Understanding the context in which feeding or eating problems occur can help identify appropriate treatment components (e.g., psychoeducation, improving parent-child feeding relationship).

Limitations

Although this review represents an important step toward understanding feeding and eating problems in autistic youth, it has some limitations. First, our search was limited to empirical studies that used an objective measure of feeding or eating problems, and so may have excluded qualitative studies examining this topic. While using objective measures is important to characterize behaviours, valuable information on unmeasured related issues (e.g., parental approach to feeding, parent-child feeding relationship) could not be fully understood. Relatedly, because we did not include studies exclusively examining mealtime behaviours, an understanding of the context in which the feeding and eating problems occur was limited. Second, given the variable terminology in the literature, it is possible that, despite our efforts to

be inclusive, some relevant empirical studies may have been inadvertently excluded. Finally, because we excluded investigations of feeding and eating problems in the presence of another medical condition (e.g., gastrointestinal disorders, epilepsy), our results may not be representative of the full breadth of feeding and eating problems that occur in the heterogeneous population of autistic youth.

Conclusion

Despite inconsistent terminology to describe the specific feeding and eating problems autistic youth may experience, there is clear evidence that such issues are common in this population. Most studies indicated that food selectivity was a pervasive issue among their samples of autistic youth. Only a few studies examined eating problems, but they suggested that youth with autism may be at higher risk than others for developing eating problems. The presentation and occurrence of feeding and eating problems are likely affected by factors including age, sex, gender, cognitive and adaptive functioning, and severity of autism traits. Research on feeding and eating problems in youth with autism is continually expanding, though particular attention needs to be placed on the co-occurrence of eating disorders and autism. Given that such problems affect a large proportion of autistic youth, continued research that aims to understand the prevalence, development, maintenance, and potential remission of feeding and eating problems is critical.

Table 2.2*Studies of Feeding and Eating Issues in Children and Adolescents with Autism¹*

Author (year)	N^a	Sample Characteristics^b	Age Range (Mean)	Feeding/Eating Measure	Control Group(s)^c	Primary Findings
Aponte & Romanczyk (2016)	38	AD(58%), AS(11%), PDD-NOS(18%), ASD(13%). Sex: 84% male	3-12 years (M:6).	BAMBI, FFQ	None	ASD severity predicted feeding problem scores and duration of negative vocalizations during meal observations. 39% of participants showed low food acceptance.
Attlee et al. (2015)	23	Autism. Sex: 78% male	5-16 years (M:NA).	BAMBI, FPI, 3-day food record	None	Participants had mealtime concerns related to limited variety, food refusal and picky eating. Sample had a high rate of food rejection.
Bandini et al. (2010)	53	Autism. Sex: 83% male	3-11 years (M:6).	FFQ, 3-day food record	TD(58)	Autistic children had significantly more food refusal and limited food repertoire vs. controls.
Bandini et al. (2017)	18	Autism. Sex: 89% male	NA (Baseline M:6; Follow-up M:13).	FFQ, MIOH, 3-day food record	None	Food refusal improved from baseline to follow-up but repertoire of foods eaten did not. Rates of high food selectivity (FS) decreased from 83% to 44% between time-points.
Beighley et al. (2013)	269	AD(127), PDD-NOS(82), AS(60). Sex: 70% male	2-18 years (AD M:7; PDD-NOS	ASD-CC	Atyp Dev(107), TD(149)	Children with ASDs had more FS vs. non-ASD groups. There was a downward trend in FS severity across childhood; as children got older FS decreased.

			M:7; AS M:10).			
Bitsika & Sharpley (2018)	52	ASD. Sex: 100% female	6-17 years (M:10).	SWEAA	None	11% of scores from parents and daughters fell into the “usually-always” range.
Castro et al. (2016)	49	ASD. Sex: 100% male	4-16 years (M:10).	BPFAS	TD(49), matched	ASD group had higher levels of overall problematic eating behaviour but did not significantly differ from controls on factor scores (e.g., picky eating, refusal based on food texture, general refusal).
Chistol et al. (2018)	53	Autism. Sex: 83% male	3-11 years (M:6).	FFQ, Sensory Profile	TD(58)	Autistic children were more likely to demonstrate oral sensory sensitivity. Autistic youth with atypical oral sensory sensitivity refused more foods and demonstrated more restrictive eating behaviours.
Curtin et al. (2015)	53	Autism. Sex: 83% male	3-11 years (M:6).	FFQ, MIOH	TD(58)	Children in autism group were more likely to have high FS and mealtime behavior problems.
Diolordi et al. (2014)	33	Autism. Sex: 82% male	2-9 years (2 ranges: 2-5.9 years, 6-9.5 years).	CEBI, author-created food frequency measure	TD(35); age matched	Autistic children showed more eating problems in 6-9.5 years age range. Autism group had more mealtime rituals and generally ate below recommended amounts of all food groups. Overall eating problems decreased at 1-year follow-up for the autism group.

Emond et al. (2010)	79	ASD. Sex: NA	6, 15, 24, 38, and 54 months.	Author-created food frequency questionnaires	TD(12901)	Children with ASD demonstrated feeding symptoms from infancy and had less varied diet from 15 months of age.
Hubbard et al. (2014)	53	Autism. Sex: 83% male	3-11 years (M:6).	FFQ, Sensory Profile	TD(58)	Autistic children refused significantly more foods for more reasons (e.g., taste/smell). Consistency/texture was the most common reason for both groups, but prevalence was much higher in autism (77.4% vs. 36.2%).
Johnson et al. (2008)	19	Autism. Sex: NA	2-4 years (M:39.2 months).	Author-created feeding assessment survey, FFQ, 24-hour dietary recall	TD(15)	Autistic children had more feeding problems, particularly related to idiosyncratic refusal of foods based on color, texture, and type. Groups did not differ on nutritional status.
Johnson et al. (2014)	256	Autism(174), AS(21), PDD-NOS(57). Sex: 84% male	2-11 years (M:5).	BAMBI, Short Sensory Profile, 3DFR Healthy Eating Index	None	Strong associations between feeding habits and repetitive and ritualistic features, sensory features, and externalizing and internalizing behaviour. No association between feeding behaviours and social and communication deficits and IQ.
Kalyva (2009)	56	AS. Sex: 100% female	12-18 years (M:14).	EAT-26 (self and parent report)	TD(56); age and BMI matched	AS group showed significantly more eating problems according to self- and mother-report.

Kerwin et al. (2005)	89	PDD-NOS(51%), AD(39%), AS(9%). Sex: 79% male	3-17 years (M:8).	Author-created eating behaviour measure, GI symptoms, related behaviour	None	Majority of children had unusual eating habits. Only 6.7% of parents indicated their child had a feeding problem. 62% of children had FS, 29% of the sample exhibited pica.
Kral et al. (2014)	25	ASD. Sex: 72% male	4-6 years (M:5).	Modified Child Neophobia Scale, 35-item CEBQ, CFQ, PFSQ	TD(30)	Autistic children were at increased risk for food avoidance behaviors. ASD group had significantly more food fussiness than controls, those with ASD and oral sensory sensitivity showed more food avoidance, food fussiness, and emotional undereating.
Kuschner et al. (2015)	65	ASD. Sex: 89% male	12-28 years (M:16).	AASP	TD(59)	ASD group was significantly more likely to be food neophobic, more likely to report disliking textured foods, and less likely to enjoy strong tastes vs. controls. FS issues appeared to be linked to daily living skills.
Malhi et al. (2017)	63	ASD. Sex: 91% male	4-10 years (M:6).	CEBI, 3-day food record	TD(50); age and SES matched	ASD group had significantly more feeding problems and ate significantly fewer food items. Autistic children were 6x more likely to be picky eaters than controls and were particularly averse to eating vegetables and fruits.

Marshall et al. (2016)	33	ASD. Sex: 76% male	2-6 years (M:52 months).	BPFAS, 3-day prospective diet record	Nonmedically complex history(35)	Children with ASD showed increased FS; differences between ASD and controls were found predominantly on measures of general behaviour rather than feeding behaviours.
Martins et al. (2008)	41	AD(35), AD or PDD-NOS diagnosis but under CARS cut-off(6). Sex: 83% male	2-12 years (M:7).	Author-created eating behaviour questionnaire, BPFAS, FNS	TD(41), TD siblings of ASD sample(14); gender and age matched	Children with ASDs were marginally more likely to exhibit picky eating than their siblings or matched TD children. Rates of ritualistic feeding behaviours were similar across groups but children with autism were more likely to have current problematic eating and feeding behaviours.
Matson et al. (2009)	114	Autism(72), PDD-NOS(40). Sex: 66% male	3-16 years (M:8).	ASD-CC	TD(114), Atyp Dev(53)	No significant differences between autism and PDD-NOS group on measures of feeding problems. Significantly higher rates of feeding problems across all items in ASDs group vs. atypically or typically developing. ASDs group showed problems with FS and eating style (pica and rapid eating).
Mayes et al. (2019)	146 2	Sample 1: Autism(1443). Sex: 79% male; Sample 2: Autism(19). Sex: 51% male	Sample 1: 1-17 years (M:6). Sample 2: 1-18 years (M:10).	CASD	Other Disabilities(327), TD(313)	Atypical eating behaviours 5x more common in autism group than other disorders group and 15x more common than typical development group. Limited food preferences were the most common atypical eating behaviour in autism group. Most children with autism had 2+ types of atypical

						eating (e.g., sensitivity to textures, idiosyncratic mealtime rituals).
Nadon et al. (2011)	95	Autism(61%), PDD-NOS(29%), AS(10%). Sex: 92% male	3-10 years (M:7).	Eating Profile, Short Sensory Profile	None	Children with higher sensory problems had significantly more eating problems. Tactile sensitivity, taste and smell sensitivity, and visual/auditory sensitivities were associated with significantly more eating problems.
Peverill et al. (2019)	396	ASD. Sex: 84% male	24-60 months; data collected across 4 time-points.	BPFAS	None	Feeding problems followed four distinct trajectories: (1) began low and remained stable; (2) moderate at outset and declined over time; (3) high during preschool which declined to average by school age; and (4) severe, chronic feeding problems. Feeding problems were more highly correlated with general behaviour problems than with ASD symptom severity. Few strong predictors of feeding problems were identified.
Postorino et al. (2015)	158	ASD. 2 groups: ASD+FS(79); age and gender matched ASD+no FS(79). Sex: 86% male	3-12 years (M:7)	Revised FFQ, parent interview	None	92% of parents of children with FS observed food refusal in their child. All FS children showed at least one sensory factor linked to FS; 41% showed 2 sensory factors; 23% showed 3 sensory factors. Children in FS group had significantly higher ASD symptoms and significantly lower cognitive functioning vs. noFS group.

Råstam et al. (2013)	377	ASD only(89), ASD+ADHD(288). Sex: 74% male	9 and 12 years.	A-TAC Feeding/Eating Module	ADHD only(903), no ASD + no ADHD(11 024)	Prevalence of eating problems was significantly higher in children with ADHD and/or ASD. Social interaction problems were strongly associated with eating problems in girls, and impulsivity and activity problems were associated with eating problems in boys.
Schreck & Williams (2006)	138	Autism(100), PDD- NOS(47), AS(29). Sex: 88% male	4-12 years (M:8).	CEBI, FPI	None	Children ate only a small variety of presented foods. Restricted variety was primarily related to food presentation (e.g., utensils, food items touching on plate). Selectivity was not related to autism symptoms.
Schreck et al. (2004)	138	Autism. Sex: 88% male	7-9 years (M:8).	CEBI, FPI	No autism or PDD diagnosis(298)	Autism group showed higher feeding problems, refused more foods, were more likely to require specific utensils/food presentations, and had preference for low texture foods vs. controls. 72% of autistic children ate a narrow variety of foods.
Sharp et al. (2013)	30	ASD. Sex: 77% male	3-8 years (M:68 months)	FPI, BAMBI, mealtime observation	None	In laboratory observation, FS was associated negatively with childrens' acceptance of bites (i.e., food offered) and positively with mealtime behaviour. Increased FS was positively correlated with problem behaviors during the observation, while ASD symptom severity was unrelated to feeding data.

Suarez et al. (2014)	52	ASD. Sex: 88% male. Follow-up sample ranging from 11-21 months	4-12 years (M:8).	Author-created FS questionnaire	None	No change in FS level across time-points. There was a stable, significant relationship between FS and sensory over-responsivity; children with higher sensory sensitivities also had higher FS.
Suarez (2017)	31	ASD. Sex: 90% male	4-14 years (M:9)	Laboratory food acceptance	TD(21)	Significant relationship between foods accepted and age for ASD group. Children with ASD accepted significantly fewer foods total and fewer foods from each group compared to controls, except snack foods. No relationship between foods accepted and ASD symptom severity.
Wallace et al. (2018)	37	ASD. Sex: 89% male	8-11 years (M:10)	Child Neophobia Scale	Non-ASD(4564)	Children with ASD had more FN than peers. Subclinical associations found between FN and ASD traits. Higher FN was associated with lower BMI, but the combination of increased ASD traits and increased FN was linked with increased BMI.
Williams et al. (2005)	64	ASD. Sex: 91% male	24-129 months	Food frequency questionnaire, 3-day food diary	Special needs(45), TD(69)	No significant differences between groups on types of food consumed or liquid intake. Autistic children had more mealtime behaviours related to insistence on sameness (e.g., utensils, food preparation methods).

¹3DFR: 3-Day Food Record (Guenther et al., 2006); AASP: Adult/Adolescent Sensory Profile (Brown & Dunn, 2002); ASD-CC: Autism Spectrum Disorder-Comorbidity for Children (Matson, & Gonzalez, 2007); Atyp Dev: atypically developing; A-TAC: The Autism-Tics, AD/HD and Other Comorbidities Inventory (Larson et al., 2010); BAMBI: Brief Autism Mealtime Behavior Inventory (Lukens & Linscheid, 2008); BPFAS: Behavior Pediatrics Feeding Assessment Scale (Crist & Napier-Phillips, 2001); CARS: Childhood Autism Rating Scales (Schopler et al., 1980); CASD: Checklist for Autism Spectrum Disorder (Mayes, 2012); CEBI: Children's Eating Behavior Inventory (Archer et al., 1991); CEBQ: Child Eating Behavior Questionnaire (Wardle et al., 2001); CFQ: Child Feeding Questionnaire (Birch et al., 2001); EAT-26: Eating Attitudes Test-26 (Garner et al., 1982); FFQ: Food Frequency Questionnaire (checklist to obtain frequency of food and beverage consumption; exact questionnaire varied by

study); FN: food neophobia; FNS: Food Neophobia Scale (Pliner & Hobden, 1992); FS: food selectivity; FPI: Food Preference Inventory (unstandardized measure to ascertain food preferences); MIOH: Meals in Our Household Questionnaire (Anderson et al., 2012); PFSQ: Parental Feeding Style Questionnaire (Wardle et al., 2002); SWEAA: Swedish Eating Assessment for Autism spectrum disorders (Karlsson et al., 2013); TD: typically developing.

^aSize of ASD sample

^bDiagnosis: Description of diagnosis. AD: Autistic Disorder, AS: Asperger's Syndrome, PDD-NOS: Pervasive-Developmental Disorder-Not Otherwise Specified, ASD: sample not characterized by specific diagnoses, ASDs: where groups of varying ASD diagnoses were combined.

^cComposition of control group/comparison scores (N = number of subjects).

Chapter Conclusion

The manuscript included in this chapter provided an overview of the literature on feeding and eating problems in autistic young people. Many autistic young people experience feeding problems and there is emerging evidence to suggest autistic people are at risk for eating problems as well, but the literature examining eating problems is less robust. A pertinent aspect of eating problems that has been overlooked in much of the research to date in autistic young people is body image, which is the focus of the next chapter.

CHAPTER THREE: Body Image in Autistic and Non-Autistic Women and Girls

Chapter Overview

Little research has examined autistic young people's experience of body image, despite high rates of disordered eating behaviours. This chapter addresses this gap by providing a comprehensive description of how a sample of autistic women and girls experience body image. Further, multiple dimensions of body image were compared between autistic and non-autistic women and girls. The manuscript presented in this chapter has been prepared for submission to an autism-focused journal (e.g., *Autism*, *Autism Research*, *Research in Autism Spectrum Disorders*).

Abstract

Autistic people experience high rates of disordered eating, especially eating disorders involving food restriction. A disturbance in body image, or how one thinks or feels about their body, is a key diagnostic criterion for many eating disorders; however, few researchers have examined autistic people's experience of body image. The current limited understanding of autistic people's body image may lead to inaccurate diagnoses and inappropriate treatment. The current study compared several aspects of body image between autistic ($n = 37$) and age-matched non-autistic ($n = 37$) women and girls. Attitudinal body image, behavioural body image, and body image importance were measured. Participants also provided insight into what influences their thoughts and feelings towards their bodies. Autistic participants had relatively high rates of body dissatisfaction. The autistic group had significantly higher attitudinal body image scores than the non-autistic group, but groups did not significantly differ on behavioural body image or body image importance. Our results highlight that although some autistic people may experience high rates of body dissatisfaction, they may have different motivations for their feelings towards their bodies.

Manuscript

Autism is a neurodevelopmental difference that affects individuals' communication styles, social skills and interactions, and behaviour. Characteristics of autism include social communication (e.g., preference for reduced levels of eye contact, often using neutral facial expressions) and behavioural (e.g., desire for predictability and routine, passionate interests or areas of expertise, sensory processing differences; American Psychiatric Association [APA], 2013; Bottema-Beutel et al., 2021) differences. Autistic people commonly experience co-occurring conditions, especially mental health conditions. Autistic young people experience substantially higher rates of mental health challenges than their non-autistic peers, with an estimated 70-80% of autistic children and adults experiencing at least one mental health condition (Simonoff et al., 2008). One type of mental health condition that has begun to receive increased attention in the autism community are feeding and eating disorders, and in particular, anorexia nervosa (AN).

The overlap between AN and autism has seen growing interest in recent years (see Westwood & Tchanturia, 2017 for a comprehensive review). A consistent finding from this area of research is that people with a range of eating disorders, but especially those with AN, show significantly more autistic traits than comparison groups (Dell'Osso et al., 2018; Karjalainen et al., 2019; Westwood et al., 2016). Autism and AN share several traits, including restrictive eating, difficulties with flexible thinking, preference for routines and predictability, intense interests, difficulty with alexithymia (i.e., difficulty identifying and describing emotional states), and challenges with maintaining attention (Kinnard & Tchanturia, 2021; Vuillier et al., 2020). Given the shared characteristics between the two conditions, it is unsurprising that rates of overlap between AN and autism are markedly higher than expected in the general population

(Westwood & Tchanturia, 2017). Although numerous studies have examined shared characteristics between eating disorders (including AN) and autism, one critical aspect of disordered eating that has received little to no attention is body image.

Broadly, body image refers to an individual's subjective evaluation about their appearance (Cash & Smolak, 2011). Although there is no universally accepted definition of body image, most researchers agree that it is a multidimensional construct that consists of both self-perceptions and attitudes regarding one's physical appearance (Cash et al., 2002; Thompson, 2004). Additionally, it is generally accepted that body image disturbance is an umbrella term that describes several dimensions of body image, with attitudinal, perceptual, and behavioural aspects being involved (Cash, 2012). It is important to highlight the distinction between body image disturbance and body dissatisfaction, as these terms are often erroneously used interchangeably. While the term 'body image disturbance' describes the multidimensional construct, 'body dissatisfaction' is a specific dimension of body image disturbance and describes the negative beliefs about and cognitive appraisals of one's appearance (Cash, 2012). Body dissatisfaction is widespread, with some researchers suggesting body dissatisfaction is normative, particularly in women (Murnen & Smolak, 2019). Conversely, body image disturbance is severe, pervasive, and central to eating pathology (APA, 2013; Cash et al., 2002; Murnen & Smolak, 2019).

Body image disturbance is theorized to underpin maladaptive eating and weight-loss behaviours (Fairburn et al., 2003), and is considered a central construct related to the development and maintenance of eating disorders (Murnen & Smolak, 2019). Disturbances in body image are included in the diagnostic criteria for AN and bulimia nervosa (BN), as well as an exclusionary criterion for avoidant restrictive food intake disorder (ARFID; APA, 2013). Body image disturbance is also theorized to influence the maintenance of other eating pathology

(e.g., binge eating, dietary restriction; Fairburn, 2008; Grilo et al., 2008). Despite the importance of body image disturbance in eating disorders, the construct is often oversimplified (e.g., using only weight/shape concerns to represent body image disturbance; Wade et al., 2011).

Much of the oversimplification surrounding body image is likely a result of the complexity of the construct. Body image disturbance is multidimensional, with the dimensions interconnected (Cash, 2002; Prnjaka et al., 2022). However, researchers often select narrow aspects of body image disturbance to represent the more complex construct, disregarding the differing ways in which body image disturbance can manifest. For example, body image disturbance can manifest as excessive dissatisfaction with one's appearance, excessive engagement in behaviours such as grooming or checking, and/or avoidance of situations where body may be emphasized or exposed (Cash, 2012).

Commonly agreed upon dimensions of body image include attitudinal, perceptual, and behavioural (Cash, 2012; Delinsky & St. Germain, 2012). The attitudinal aspect of body image is further delineated into evaluation/affect (often referred to as affective or evaluative), which captures the feelings that a person has about their body size and shape (Cornelissen et al., 2019), and investment, which describes the psychological importance that an individual places on their appearance (Cash, 1994). Attitudinal body image is typically measured through self-report questionnaires that ask about weight/shape overevaluation, body (dis)satisfaction, and (dis)like of body/body parts (Prnjaka et al., 2022). The perceptual component of body image describes the extent to which a person can accurately judge their appearance on some physical dimension (Cash, 2012). Perceptual body image is measured through various means such as having people estimate their body size through drawings or measurements, indicating one's perception of their body size by selecting from distorted images of themselves, or selecting figures that they believe

best represent their body shape/size (Prnjaka et al., 2022). Finally, the behavioural component of body image involves behaviours an individual engages in such as checking, fixing, and avoiding which reinforce negative thoughts and perceptions about body image, acting as a maintaining factor for body image disturbance (Delinsky & St. Germain, 2012). Behavioural body image is measured using self-report questionnaires that assess the frequency of body avoidance (i.e., avoiding being confronted by one's body shape, size, or weight by avoiding mirrors, camouflaging one's shape by wearing oversized clothing) and body checking behaviours (i.e., repeated behaviours one completes to assess their shape, size, or weight such as pinching skin or measuring circumference of body parts; Walker et al., 2018). Most individuals with AN and BN experience challenges with multiple aspects of body image (Prnjaka et al., 2022; Sattler et al., 2020; Walker et al., 2018).

Despite increased attention given to the overlap between eating disorders and autism, few researchers have described autistic people's experience of body image. Jachyra and colleagues (2019) interviewed eight higher-weight (i.e., body mass index above 85th percentile) autistic youth (aged 11 to 17 years) to understand their perspectives and experiences of discussing weight-related topics with healthcare practitioners. One of the themes that emerged highlighted difficulty that the autistic youth had with reconciling weight gain and body image issues. Specifically, participants did not know how to cope with their changing weight and were often preoccupied/obsessed with their weight, suggesting that autistic youth at higher weights may experience similar attitudinal body image issues as those seen in general population adolescents. In contrast, Walker and colleagues (2020) explored what matters to eight higher weight autistic youth (aged 10 to 18 years) regarding weight and their bodies. An overarching theme that emerged was that weight was not a primary concern for the participants. In fact, subthemes

suggested many participants had a positive sense of body image and valued moving their bodies more than their body's shape or size (Walker et al., 2020). These contradictory findings highlight the heterogeneous experiences of body image and weight-related concerns of autistic youth.

Remarkably, very few studies have investigated autistic adults' experiences of body image. Healy and colleagues (2021) examined autistic adults' perceptions of weight management, body weight, and body image. Several important points emerged through their qualitative analysis, including that many autistic adults reported experiencing body dissatisfaction, and that participants often engaged in social comparisons similar to what has been documented in neurotypical people. Interestingly, several participants also expressed that they viewed their body as a means of camouflaging or blending in with the predominately neurotypical population (Healy et al., 2021). Autistic people's desire to fit within cultural beauty norms is not surprising, given the sociocultural pressures to value appearance; however, the use of one's body as a means of autistic camouflaging presents a novel potential predictor of body image dissatisfaction. One study to date examined body image in non-autistic samples and included measures of autistic traits in their analyses. Krumm et al. (2017) hypothesized that autistic people with lower support needs may be especially prone to negative experience and evaluation of their bodies. They measured autistic traits in a non-clinical sample of college students to determine whether these traits predicted scores on evaluative/affective measures of body image. Although they found that greater levels of autistic traits significantly predicted lower body image satisfaction, given that none of the participants were autistic, these results may not accurately represent the experience of autistic people.

In an effort to directly measure body image in a sample of autistic people, Asada and colleagues (2018) examined perceptual body image in autistic adolescents (primarily males)

using shoulder width estimation. They found that the autistic youth estimated their shoulder width less accurately than their non-autistic peers. The authors concluded that autistic individuals experience misperceptions in their body size and highlighted the relation between body image disturbances and AN, suggesting that further research in body image in autistic people may help elucidate the relation between AN and autism (Asada et al., 2018). While this study represents an important preliminary step, several flaws limit the utility and generalizability of their effort to elucidate the relation between autism and body image, including a narrow measure of body image and an almost exclusively male sample.

Research Objectives

Researchers have only recently begun to examine body image and eating- and weight-related behaviours in autistic individuals, and the literature remains extremely limited. Although previous studies provide an important first step in examining body image in autistic individuals, research on the subject has either focused on narrow, unidimensional aspects of body image (e.g., body dissatisfaction) or has measured body image through open-ended questions alone rather than using quantifiable measures. Additionally, much of the research examining body image, eating, and weight-control behaviours has been conducted with autistic people with active eating disorders. Little research has included community samples, which is important given that subclinical eating disturbances (including body image concerns) are associated with high levels of functional impairment and increase the risk of developing clinically significant eating disorders (Stice et al., 2017).

How autistic people experience and perceive their body remains unclear; it is unknown whether autistic people experience similar body image concerns to their non-autistic peers and if these body image concerns are related to eating behaviours. Given the increasing evidence to

suggest that there is an overlap between autism and eating disorders, an understanding of how autistic people experience body image is critical. Therefore, the current study aimed to examine how autistic youth and young adult women experience body image and compared their experience of body image to their non-autistic peers. This was achieved through multidimensional measurement of body image.

The current study aimed to address the following research questions:

1. To what extent do autistic and non-autistic women/girls experience attitudinal and behavioural body image disturbances?
2. Do attitudinal and behavioural body image scores significantly differ between autistic and non-autistic groups?
3. Do groups differ in the amount of importance they place on body image?

Given previous research, it was expected that autistic and non-autistic groups would significantly differ on overall scores of body image concerns. Specifically, it was anticipated that autistic traits such as alexithymia would influence lower attitudinal body image scores in the autistic group. In contrast, given autistic people's propensity to engage in more repeated behaviours, the autistic group was anticipated to endorse higher behavioural body image scores. Consistent with previous literature demonstrating that autistic people tend to focus on what their bodies are capable of rather than concern over their weight or shape (Walker et al., 2020), it was again anticipated that groups would significantly differ, with the autistic group endorsing lower scores on a measure of body image importance.

Method

Participants

Forty-two autistic young people and 54 non-autistic young people participated in this online study. Participants were required to be able to read and write in English and were required to not be in treatment or on a waitlist for treatment for an eating disorder. Recruitment targeted individuals who reported both female sex and identified as a woman; however, given that autistic people present with more diverse gender identities than their non-autistic peers (Øien et al., 2018; Pecora et al., 2020) participation was not restricted if participants reported either female sex or that they identified as a woman. Following data integrity checks, data cleaning, and matching, the final sample was comprised of 37 autistic participants and 37 non-autistic participants. Participants were matched based on chronological age such that each autistic participant had a non-autistic participant matched up to 9-months of their age.

Of the 37 autistic participants included in the final sample, 76% ($n = 28$) had received a formal autism diagnosis from a health professional. Twenty-four percent ($n = 9$) self-identified as autistic, including two participants undergoing an autism assessment and one person on an assessment waitlist at the time of participation. The mean age of diagnosis was 16.5 years ($SD = 6.49$, range: 3-24). This study included individuals with a formal autism diagnosis and those who self-identified as autistic in light of the significant barriers to diagnostic assessment many people encounter (Overton et al., 2023). Demographic characteristics for participants are included in Table 3.1.

Table 3.1

Demographic Information

Characteristic	Non-Autistic Group		Autistic Group	
	<i>n</i>	%	<i>n</i>	%
Gender				
Woman	37	100	30	81
Nonbinary	0	0	3	4.1
Agender	0	0	2	5.4

Prefer to self describe	0	0	2	5.4
Sex assigned at birth				
Female	37	100	36	97.3
Male	0	0	1	2.7
Racial/ethnic group ^a				
Black	1	2.7	2	4.9
East Asian	1	2.7	2	4.9
Southeast Asian	2	5.4	2	4.9
Indigenous	0	0	1	2.4
Latino/Latinx	3	8.1	3	7.3
Middle Eastern	2	5.4	0	0
South Asian	10	27	1	2.4
White	17	45.9	26	63.4
Another race/ethnicity	1	2.7	4	4.9
Country				
Canada	35	94.6	7	18.9
United Kingdom	0	0	5	13.5
United States	0	0	13	35.1
Other	1	2.7	12	32.4
Missing	1	2.7	0	0
Annual household income				
Under \$20,000	10	27	7	18.9
\$20,000-\$49,999	2	5.4	8	21.6
\$50,000-\$74,999	2	5.4	3	8.1
\$75,000+	14	37.8	6	16.2
Prefer not to say	9	24.3	13	35.1
Employment				
Working for pay	10	27	10	27
Attending school	27	73	22	59.5
At-home parent	0	0	1	2.7
Volunteering	0	0	2	5.4
Missing	0	0	2	5.4
Psychiatric diagnoses ^b				
ADHD/ADD	4	10.8	11	29.7
Anxiety	6	16.2	29	78.4
Depression	5	13.5	22	59.5
Learning disability	0	0	3	8.1
Eating/feeding disorder	0	0	8	21.6
Sleep disorder	0	0	6	16.2
Substance use disorder	0	0	2	5.4
Other	1	2.7	3	8.1

Note. $N = 74$ ($n = 37$ for each group). Participants were on average 21.09 years old ($SD = 2.11$), and participant age did not differ by group.

^a Participants were able to select more than one category. ^b Includes previous and current diagnoses.

Measures

Attitudinal Body Image. Attitudinal body image was measured using the Weight Concern and Shape Concern subscales from the Eating Disorder Examination Questionnaire (EDE-Q), Sixth Edition (Fairburn & Beglin, 1994). The EDE-Q is one of the most used measures of eating pathology and the aforementioned subscales have been widely used to assess attitudinal body image (Kling et al., 2019; Prnjak et al., 2022). The EDE-Q generates subscale and global scores that are obtained by averaging the item responses, with higher scores suggesting greater eating disorder psychopathology. A cut-off score of 4 on the EDE-Q (global or subscale score) is commonly used to indicate clinical significance (Carter et al., 2001; Luce et al., 2008). This measure has been used across a wide age range and its use in adolescents and young adults is supported by numerous studies examining the scale's psychometric properties (Berg et al., 2012; Rand-Giovannetti et al., 2020). In an extensive systematic review of body image measures, Kling and colleagues (2019) found that scores on the Weight and Shape Concerns subscales were generally considered valid and reliable across a range of (predominantly female) populations. Although the structural validity of the measure has been questioned (e.g., Allen et al., 2011; Wade et al., 2008), this questioning has primarily been related to the finding that the Weight and Shape Concerns subscales load onto the same factor and may not represent distinctly different constructs. As such, these subscales were combined for the purpose of this study. The combined subscale consisted of 12 items and was found to be highly reliable in the present study ($\alpha = .93$).

Behavioural Body Image. In line with the conceptualization of behavioural body image as being comprised of two components (body checking and body avoidance), two measures were used to assess this dimension of body image. To measure body checking behaviours, the Body Checking Questionnaire (BCQ; Reas et al., 2002) was used. The BCQ is commonly used to

measure body checking behaviour and its use is supported across a variety of adolescent and adult samples (Campana et al., 2013). The authors of this measure have produced evidence for the scale's internal reliability ($\alpha = .83$ to $.90$) and convergent and discriminant validity (Reas et al., 2002), with comparable results in additional studies (Campana et al., 2013; Lydecker et al., 2014). The BCQ has three first order factors (overall appearance, specific body parts, and idiosyncratic checking) that combine to provide an overall score of body checking behaviours, with higher scores indicative of greater levels of body checking behaviours (Reas et al., 2002). The 23-item scale showed excellent internal consistency ($\alpha = .93$).

To measure body image avoidance, the Body Image Avoidance Questionnaire (BIAQ; Rosen et al., 1991) was used. This measure contains 19 items and provides a frequency of body avoidance behaviours (i.e., avoidance of situations that trigger body image concerns). As such, higher scores indicate greater frequency of body avoidance. The BIAQ has demonstrated adequate internal consistency ($\alpha = .89$) and evidence of construct validity in young adult women (Lydecker et al., 2014), as well as preliminary evidence of such properties in adolescent samples (Steinfeld et al., 2018). Importantly, behavioural measures of body image have been subject to considerably less psychometric evaluation relative to affective measures of body image (Menzel et al., 2011) and this area has especially been neglected in research with adolescents more than other aspects of body image (Legenbauer et al., 2014). The internal reliability of the measure was $\alpha = .81$.

Body Image Importance. To assess the amount of importance participants place on body image, the Body Image Importance subscale of the Body Image and Body Change Inventory (Ricciardelli & McCabe, 2002) was used. High levels of internal consistency have been reported for this 10-item subscale in both adolescents ($\alpha > .90$; Ricciardelli & McCabe,

2002) and young adults ($\alpha = .87$; Siegling & Delaney, 2013). Higher scores indicate greater levels of body image importance. The broader scale from which this subscale is drawn was developed through exploratory and confirmatory factor analysis. It has demonstrated concurrent and discriminant validity, and satisfactory test-retest reliability with adolescents (Ricciardelli & McCabe, 2002). The internal consistency of this measure was excellent ($\alpha = .90$).

Open Response. In addition to the data collected through formal measures, participants were also invited to answer an open-ended question to share more information about their experience of body image. This prompt was presented as the final question in the survey to allow participants to expand on or clarify any responses they already provided. Individual responses were reviewed and the most salient comments were included.

Procedure

The study was approved by the institution's research ethics board. Recruitment took place through various social media sites (Facebook, Reddit, Twitter) and community clinics/organizations serving the autistic community, as well as the institution's undergraduate research participation system. Interested participants were asked to contact the researchers to express their interest and indicate that they met eligibility criteria. Once eligibility criteria were confirmed, participants were provided a Qualtrics link to complete the survey. Capacity to consent was confirmed by answering multiple choice questions related to the study objectives and consent process. Participants were required to answer 7 out of 8 capacity questions correctly to be deemed able to participate in the study. Participation took approximately 40 minutes and participants were welcomed to start and stop the questionnaires at their leisure. Participants were compensated with a \$10 (Canadian) online gift card upon completion of the questionnaires. At the end of the questionnaires, participants were prompted to view or download a resource to

learn more about eating disorders and body image issues as well as a document containing strategies to foster a more neutral or positive relationship with their body.

Data Analysis

Data was analyzed using SPSS Version 28. Prior to analysis, variables were examined through various SPSS functions to check for accuracy of data entry, missing values, and fit between their distributions and the assumptions of multivariate analysis. The variables were examined separately for the 42 autistic participants and the 54 non-autistic participants. Two cases from the autistic group and one case from the non-autistic group were deleted due to considerable missing data on variables of interest. There was minimal missing data within the remaining sample; where missing data was present, scores were calculated following test-developers' recommendations (e.g., totals computer for EDE-Q subscales if at least half of a subscale's items were completed; Fairburn, 2008). After handling missing data and age matching, 37 participants remained in each group. One univariate outlier was identified in the comparison group on the body checking variable; this case was also identified as a multivariate outlier. This score was winsorized to addressing the univariate outlier. This case remained a multivariate outlier along with one other case in the comparison group. Skewness and kurtosis values were examined within each group and the body checking variable was found to be moderately positively skewed in the comparison group. As a result, a square root transformation was applied to the body checking variable. With the transformed variable in the variable set, no cases were identified as multivariate outliers.

Results

Examination of scores on measures of attitudinal and behavioural body image revealed relatively high levels of body image difficulties across both groups (Table 3.2). Of particular

interest is the number of individuals in each group who reported clinically elevated levels of weight and shape concerns. In the autistic group, 9 participants (24.3%) scored above the cut-off for clinically elevated scores on the shape concern subscale and 11 participants (29.7%) scored above the cut-off on the weight concern subscale. In comparison, only 4 participants (10.8%) in the non-autistic group scored above the cut-offs for the weight and shape concern subscales. The autistic group also reported relatively higher mean levels of body checking and body avoidance.

Participants provided various reasons for their feelings and attitudes towards their body. One participant from the non-autistic group described their perceived lack of body image disturbance explaining, “I’m ok with my body because my ADHD medication made me lose a lot of weight, so I definitely don’t have a healthy relationship with body image it’s just not actively causing problems because I’m taking stimulants.” In contrast, participants from the autistic group expressed differing reasons for their body image issues: “It is very interesting to see the questions, because a lot of my body issues are very much connected to my height [...] and therefore it is more about taking up space rather than my weight per se.” Another autistic participant described, “my [body image] challenges have nothing to do with my excessive few kilos, [but with gender dysphoria]”. Lastly, while many autistic participants described how they struggled with body image issues more when they were younger, one participant described, “I don’t actually have a body image [...]. I have no idea how I look socially. I know what my physical shape is, but I have no comprehension of what that means socially or how I’d be compared to others.”

The second research question sought to examine whether groups differed on attitudinal and behavioural body image measures. A one-way multivariate analysis of variance (MANOVA) was run to determine the effect of group membership (autistic versus non-autistic) on body

image. Three measures of body image were assessed: weight and shape concern, body avoidance, and body checking behaviours. Preliminary assumption checking indicated data was approximately normally distributed, there were no univariate or multivariate outliers, there were linear relationships between variables of interest, no multicollinearity, and there was homogeneity of variance-covariance matrices. There was a statistically significant difference in combined body image scores based on group membership, $F(3, 70) = 4.36, p = .007$; Wilk's $\Lambda = 0.843$, partial $\eta^2 = .157$. Follow-up univariate ANOVAs using a Bonferroni adjusted α level of .017 (0.5/3) revealed only the shape and weight concern score significantly differed between groups (see Table 3.2), suggesting autistic participants endorsed greater levels of weight and shape concerns than their non-autistic peers.

Table 3.2

Means, Standard Deviations, and One-Way Multivariate Analyses of Variance in Weight and Shape Concern, Body Image Avoidance, and Body Checking

Measure	Non-Autistic Group		Autistic Group		$F(1, 72)$	η^2
	M	SD	M	SD		
Attitudinal Body Image						
Weight & Shape Concern	1.88	1.26	2.78	1.61	7.24**	.091
Behavioural Body Image						
Body Image Avoidance	26.84	13.23	34.22	13.89	5.48*	.071
Body Checking ^a	6.89	1.30	7.03	1.32	.216	.003

^a A square root transformation was performed on body checking scores to address significant skewness. Values reflect the square root of scores. Untransformed scores: M autistic group = 51.16, $SD = 18.30$, M non-autistic group = 49.14, $SD = 19.57$.

* $p < .05$. ** $p < .01$.

For the final research question, an independent samples t-test was conducted to examine if groups significantly differed on the amount of importance they place on their body image.

There was no significant effect for group membership, $t(72) = 1.15, p = .75$, with the non-autistic

group ($M = 31.92$, $SD = 8.28$) endorsing only slightly higher scores than the autistic group ($M = 29.65$, $SD = 8.75$).

Discussion

There is emerging evidence to suggest high rates of overlap between eating disorders and autism, but little is known about how body image, a key diagnostic criterion of many eating disorders, is experienced by autistic people. To address this gap, this study aimed to examine how a community sample of autistic women and girls experience body image and compared their experience to their non-autistic peers. Nearly a quarter of the autistic group reported clinically elevated scores on the shape concern subscale and close to a third of autistic participants reported clinically elevated scores on the weight concern subscale. In contrast, only 10% of the non-autistic participants reported clinically elevated shape and weight concern scores. While the rates of clinically significant shape and weight concern in the non-autistic group are comparable to rates found previously in studies with undergraduate women (e.g., 14.8% on shape concern and 10.2% on weight concern; Luce et al., 2008), the proportion of the autistic group with clinically significant weight and shape concern is substantially higher. The findings of high levels of shape and weight concern in the autistic group contrast with previous literature suggesting body dissatisfaction may be less salient in autistic women (discussed further below; Babb, 2022). However, the findings of relatively high levels of body dissatisfaction in autistic women and girls are consistent with Healy and colleagues' (2021) qualitative study where body dissatisfaction was pervasive among the 11 autistic adult participants. In the non-autistic group, the body avoidance and body checking scores were comparable to mean scores found in previous studies with undergraduate women (e.g., 52.14 [$SD = 17.95$] for BCQ and 26.18 [$SD = 10.84$] on

the BIAQ; Lydecker et al., 2014). The autistic group's mean body checking score was also comparable to the previous literature, but the mean body avoidance score was slightly higher.

Responses to the open-ended question highlight the diverse reasons autistic and non-autistic people experience body image concerns. Although this data is not rich enough to draw conclusions or generate themes from the responses, several autistic participants expressed less emphasis on their shape or weight but described how other aspects of their appearance or identity that might impact their feelings about their body. Further research is needed to understand how multiple aspects of one's identity impacts autistic people's body image development across the range of eating pathology.

Our hypothesis that groups would significantly differ on overall body image measures was supported; however, the aspects of body image that significantly differed contrasted with what was anticipated. Although the autistic group reported significantly higher levels of body image concerns overall, groups did not differ in their body checking or body avoidance behaviours. The finding of no significant difference in body checking is unexpected given previous literature highlighting the intense nature with which some autistic people monitor physical changes in their body. For example, Healy et al. (2021) found that some autistic adults experienced 'obsessions with their bodies' leading them to engage in body checking (e.g., weighing self) daily. Obsessive interests with their bodies were also reported by participants in Brede et al. (2020), where participants described their disordered eating behaviours becoming an intense interest. Given that the sample was required to not have an active eating disorder, it is possible that checking behaviours as measured by the BCQ are less prevalent at sub-clinical levels. Regarding body avoidance behaviours, although not significantly higher than the non-autistic group, the reasons why autistic people might avoid being exposed to their body may

differ. For example, body avoidance can manifest as preferring to wear loose or baggy clothing to avoid being confronted with one's body shape. Autistic people may prefer loose clothing to avoid uncomfortable sensory experiences. Another manifestation of body avoidance is to avoid looking at oneself in the mirror. Given the higher rates of gender diversity in autistic people (Øien et al., 2018; Pecora et al., 2020), motivations for autistic people's avoidance of looking in the mirror may be related to gender dysphoria rather than avoidance of their shape or weight, as highlighted by some of the participants in the present study.

In contrast to the hypothesis, the autistic group endorsed higher levels of attitudinal body image concerns (i.e., body dissatisfaction) than their non-autistic peers. In a clinical sample of autistic women with a restrictive eating disorder, Babb (2022) found significantly lower levels of body dissatisfaction compared to non-autistic women with a restrictive eating disorder, and autistic women without an eating disorder had even lower levels of body dissatisfaction than both groups. The author concluded that for some autistic women with an eating disorder, body dissatisfaction may not be a core feature of their eating pathology (Babb, 2022). The differing results between the present study and Babb (2022) may be related to sample differences, with the current sample being substantially younger (in Babb, 2022 the mean age of autistic participants with an eating disorder was 30.9, range: 18-61 years and mean age of non-autistic participants with an eating disorder was 29.9, range: 18-63 years). Alternatively, the difference in findings may be related to different presentations between community and clinical samples. Additional research is required to further understand autistic people's body dissatisfaction throughout the lifespan and across the spectrum of eating pathology (i.e., subclinical to clinical). Groups in the present study did not differ on the amount of importance they place on their body image. Given that previous literature (e.g., Babb, 2022; Brede et al., 2020; Healy et al., 2021) has produced

conflicting results, further investigation of the amount of importance autistic people place on their body image will be critical to understand their experience of body dissatisfaction and to understand whether importance plays role in clinical versus subclinical presentations of eating problems.

Limitations and Future Directions

Several limitations should be considered in the interpretation of the findings. First, the autistic group represents a segment of the autistic population who have proficient communication, reading, and writing skills. As such, the findings did not capture the experience of autistic people with higher support needs. Inclusion of autistic people with higher support needs and/or intellectual disability is an important extension of this research, especially considering the unique eating challenges these individuals may experience (e.g., higher rates of eating inedible items, difficulty communicating food preferences; Fields et al., 2021; Matson et al., 2012). Second, the autistic group in the current study was much more psychiatrically complex than the non-autistic group. Although autistic people are significantly more likely than their non-autistic peers to have higher rates of co-occurring mental health conditions (Lai et al., 2019), this may have confounded comparisons between groups. Future research should aim to match psychiatric complexity or presence of co-occurring mental health issues between groups. Additionally, given the differences in recruitment methods between groups, where the autistic group was largely recruited through social media and the non-autistic group was almost exclusively recruited from an existing pool of undergraduate research participants, there may be inherent differences between groups. Specifically, factors such as education level, socioeconomic position, and broader social determinants of health may have contributed to some of the differences between groups. Finally, this study did not include a measure of perceptual

body image. As such, whether perceptual body image disturbances contribute to differences in autistic people's experience of body image was unable to be clarified. Future research should examine perceptual body image alongside attitudinal and behavioural body image to create a more comprehensive understanding of autistic people's body image.

Clinical Implications

Several findings from the current study are of relevance to clinicians in multiple areas of practice. Clinicians completing autism assessments should be aware of the potential overlap between autism and eating disorders, and people presenting for an autism assessment should be screened for eating disorders and body image disturbances. Likewise, clinicians working with people with eating disorders should screen for autistic traits and modify treatment accordingly, and in particular, clinicians should ask about motivations for eating and weight-related behaviours. The findings suggest that clinicians should pay particular attention to weight and shape concerns in this population. Despite the differences between findings from the present study and previous studies where authors suggested body image may not be an important factor in many autistic people's disordered eating (e.g., Babb, 2022; Brede et al., 2020), the current findings underscore the importance of taking an individualized approach with each patient.

Conclusion

This is one of very few studies examining body image in autistic people. Autistic women and girls were found to experience significantly more body dissatisfaction than their non-autistic peers. Although groups did not significantly differ in the amount of body checking or body avoidance behaviours they engaged in, autistic people likely experience a wider range of reasons for engaging in these behaviours (e.g., due to sensory challenges). Likewise, autistic people may experience body dissatisfaction for differing reasons (e.g., concerns related to taking up space

rather than weight and shape per se). Autistic people should be routinely screened for body dissatisfaction and disordered eating, and treatment should be tailored to address each individual's unique experience of their body image.

Chapter Conclusion

In the general population, high rates of body image disturbances are thought to underpin maladaptive eating and weight-control behaviours (Fairburn et al., 2003; Murnen & Smolak, 2019). Given the relatively high rates of body dissatisfaction of the autistic people in the current study, an understanding of whether body dissatisfaction is related to disordered eating behaviours in this group is critical. Additionally, given that some autistic participants reported autism-specific factors behind some of their body image concerns, it is important to understand whether such factors also influence their eating behaviours. The next chapter will focus on eating and weight-control behaviours as well as body image across both groups.

CHAPTER FOUR: Eating Problems in Autistic and Non-Autistic Women and Girls

Chapter Overview

As described in Chapter 2, very little research has examined eating problems in autistic young people. Much of the research in this area has focused on feeding problems or examined the relation between eating problems and autistic traits in non-autistic people. The overemphasis on feeding problems and dearth of research on eating problems (including body image) is problematic considering body image disturbance is a primary diagnostic criterion for many eating disorders. This lack of research leaves the field's understanding of the presentation of eating disorders in autistic people incomplete. Clinically, this may lead to diagnostic overshadowing wherein individuals' feeding or eating problems are attributed to their autism. A better understanding of the prevalence and presentation of both feeding and eating problems in autistic people is critical for proper assessment, diagnosis, and treatment. This chapter provides a description and comparison of several feeding and eating problems between samples of autistic and non-autistic women and girls. Further, examinations of associations between feeding/eating problems and body image concerns are presented. The manuscript presented in this chapter has been prepared for submission to an autism-focused journal such as *Autism Research*, *Research in Autism Spectrum Disorders*, or *Autism in Adulthood*.

Abstract

The overlap between autism and anorexia has been increasingly noticed in clinical settings in the past decade, and researchers have highlighted several similarities between these conditions (e.g., executive function difficulties, socioemotional similarities). It is also well established that behaviours in line with feeding disorders are overrepresented in autistic people. Although researchers have begun to examine autistic people's experience of a broader range of eating problems, this area of research is still in its infancy and the prevalence of different eating problems in autistic populations is still unknown. It is also undetermined whether the same factors, such as body image concerns, contribute to the development and maintenance of disordered eating in autistic people. The current study compared scores on several measures of eating problems between autistic ($n = 37$) and non-autistic ($n = 37$) women and girls who were age-matched to 9-months. Symptoms of autism-specific eating problems, such as sensory aversions and rituals around food, as well as more common eating pathology were measured. Autistic participants had significantly higher scores than their non-autistic peers across all measures of eating problems. A relatively high proportion (24.3%) of the autistic group engaged in regular binge eating. High rates (16.2%) of ARFID symptoms were also found in the autistic group, and 13.5% of autistic participants endorsed clinically significant eating pathology on a common measure of disordered eating. Behavioural body image was significantly associated with multiple measures of eating pathology in the autistic group. Overall, the findings suggest some autistic people experience high rates of both autism-specific eating behaviours as well as eating pathology seen in individuals without autism. It is likely that many of the eating problems autistic people experience are influenced by a combination of autistic traits and associated challenges as well as body image concerns.

Manuscript

Autism is a neurodevelopmental condition characterized by differences in social communication and the presence of rigid, repetitive patterns of behaviour or interests (American Psychiatric Association [APA], 2013). Researchers have highlighted that autistic people experience higher rates of feeding and eating disorders than their non-autistic peers (Baraskewich et al., 2021; Karjalainen et al., 2016; Lundin Remnélius et al., 2022; Young et al., 2022). Feeding and eating disorders are severe disturbances in eating or eating-related behaviours that significantly impact a person's functioning and health (APA, 2013). Whereas eating disorders describe disturbances in eating and related behaviours where the core psychopathology of the disorder is related to concerns over one's shape, weight, and/or body image, in feeding disorders, the disturbance in eating and related behaviours are not related to concerns with weight, shape, or appearance (APA, 2013). Limited research has examined the role of body image in the presentation of feeding and eating disorders in autistic people.

Common eating disorders include anorexia nervosa (AN), bulimia nervosa, and binge eating disorder. The *DSM-5* also includes avoidant restrictive food intake disorder (ARFID), but whether ARFID best represents a feeding disorder or an eating disorder has been contested as it shares similarities with both eating (e.g., restricted intake like in AN) and feeding disorders (e.g., symptoms are not driven by concern over weight, shape or appearance; Kennedy et al., 2018). In contrast, pica and rumination disorder are universally accepted as feeding disorders rather than eating disorders.

Much of the research to date investigating autism and eating disorders has examined the presence of autistic traits in people with eating disorders. Vagni et al. (2016) examined the presence of autistic traits upon first presentation to an eating disorder clinic and found 33% of

the total sample showed high autistic traits, and prevalence did not significantly differ across eating disorder diagnoses. Compared to healthy controls, Dell'Osso and colleagues (2018) found that participants with eating disorders showed significantly more autistic traits. Further, individuals who primarily restrict caloric intake (as in restrictive AN) may show particularly high rates of autistic traits (Dell'Osso et al., 2018). In their systematic review, Huke and colleagues (2013) examined the prevalence of autism in eating disorder populations and found that the average approximate prevalence of autism across the eight studies included was 23% - considerably higher than the general population prevalence rate (approximately 1%; Zeidan et al., 2022).

Of the research in this area, researchers have primarily focused on the relation between autism and AN. In their seminal review, Westwood and Tchanturia (2017) aimed to estimate the prevalence of autism in individuals with AN. Across the eight studies included in the review, rates of individuals with AN who met clinical cut-offs for autism ranged from 4% to 52%. Although they were unable to determine precise prevalence rates, these findings clearly and consistently demonstrate elevated autistic traits in individuals with AN. Furthermore, numerous similarities between AN and autism have been identified. Kinnaird and Tchanturia (2021) developed a framework of clinical features associated with both autism and AN. These features include shared neuropsychological characteristics (e.g., difficulty with flexible thinking, specific or intense interests), social and communication difficulties (e.g., reduced non-verbal communication, social isolation, difficulty eating around other people), and sensory problems (e.g., difficulty processing and integrating sensory information, interoceptive difficulties).

A relevant debate within the literature surrounds the state or trait nature of autistic characteristics in AN (Oldershaw et al., 2011). That is, whether the autistic characteristics that

some individuals with AN experience are acute and arise from the ill-state of AN, or whether they represent a pre-existing, stable trait (Oldershaw et al., 2011; Treasure, 2013). However, only a few studies have examined the presence of clinically significant autistic traits that may be indicative of a diagnosis in individuals with AN. Westwood et al. (2018) sought to understand whether autistic traits were present in the developmental period (necessary for diagnosis of autism) in adolescent females with AN. While 53% of participants scored at or above clinical cut-offs on the Autism Diagnostic Observation Schedule, 2nd edition (ADOS-2), only 10% of their overall sample showed symptoms in the developmental period, suggesting they may meet criteria for autism (Westwood et al., 2018). In a similar study, Mandy and Tchanturia (2015) found 50% of their sample of 10 women with eating disorders, aged 19 to 38 years exceeded cut-offs on the ADOS-2. However, of those who exceeded ADOS-2 cut-offs, all participants reported that their autistic difficulties began in childhood, before the onset of their AN. Together, findings from both studies highlight that a significant portion of individuals with AN likely experience high levels of autistic traits before the onset of their eating disorder, suggesting the presence of stable autistic traits where a diagnosis may be appropriate.

Increasingly, researchers have begun to examine the inverse relation, that is the presence of disordered eating behaviours in autistic people. Several studies have used the Swedish Eating Assessment for Autism Spectrum Disorders (SWEAA), an autism-specific measure of disordered eating, and found relatively high rates of disordered eating in adolescent autistic females (Bitsika & Sharpley, 2018) and adolescent to young adult autistic males and females (Lundin Remnélius et al., 2022). High rates of disordered eating have also been found using other measures. For example, Young et al. (2022) found young autistic adults experienced more problematic eating behaviours than their non-autistic peers across multiple measures of eating pathology. In a recent

review, Schröder and colleagues (2022) concluded autistic women experience high levels of eating behaviour associated with autism (e.g., food selectivity) as well as eating pathology, but noted that there were a limited number of studies examining this relation.

Relative to the research on prevalence and shared difficulties of AN and autism, comparatively little research has examined outcomes of these individuals. Kinnaird and colleagues (2019) interviewed 13 women with AN and either co-occurring diagnosed autism or clinically significant autistic traits to understand their experiences with treatment for AN. They found that participants felt their AN and autism were deeply connected, they had more difficulty accessing and making gains in treatment, and required adaptations to their treatment. Clinicians have also endorsed a lack of confidence in treating autistic patients with AN (Kinnaird et al., 2017). Accordingly, it is unsurprising that the presence of autistic traits in people with AN is associated with more severe eating disorder symptoms and worse treatment outcomes (Tchanturia et al., 2019; Westwood & Tchanturia, 2017). To our knowledge, no research to date has examined the treatment outcomes for autistic people with eating disorders other than AN; however, it is likely that they face similar barriers to treatment and treatment progress, since autistic people more broadly experience barriers to treatment for a range of mental health concerns (Adams & Young, 2020). Given what little is known about other eating disorders experienced by autistic people, gaining an understanding of normative and problematic eating behaviours is needed.

Research Objectives

It is well established that behaviours that are consistent with feeding disorders (e.g., rumination, pica, food refusal) are overrepresented in autistic people (Råstam, 2008; Vissoker et al., 2015). In contrast, the presence of eating problems in autistic people has received less

research attention. Further, symptoms of ARFID, which exists at the crossroads of eating and feeding disorders, has received even less attention, despite high rates of overlap between ARFID symptoms and autistic traits (e.g., food selectivity, sensory sensitivity). Although researchers have begun to examine eating problems in autistic populations, this area of research is still in its infancy.

The prevalence of different eating problems in autistic populations is unknown. It is also unknown whether the same factors, such as body image concerns, contribute to the development and maintenance of disordered eating in autistic people or whether the eating problems experienced by autistic people are distinct from their non-autistic peers. Given the greater risk of poor health outcomes experienced by autistic people with food selectivity (Ma et al., 2015) and the high levels of functional impairment associated with subclinical disordered eating (Stice et al., 2017), research involving community samples of autistic people without feeding/eating disorders is needed. To address these gaps, the current study aimed to identify and describe the eating problems experienced by a community sample of autistic and non-autistic girls and women. This was achieved through the following research objectives:

1. Characterize the eating and weight-related behaviours of a community sample of autistic women and girls.
2. Determine whether there are significant differences between autistic women and girls and their non-autistic peers on measures of feeding and eating problems.
3. Evaluate if the different dimensions of body image are associated with feeding/eating problems within each diagnostic group.

Consistent with previous research, autistic women and girls were expected to experience high rates of disordered eating. Further, it was anticipated that the autistic group would score

higher than the non-autistic group across multiple measures of eating problems. For the final research question, body image concerns were expected to be associated with disordered eating in both autistic and non-autistic women and girls. Consistent with research in non-autistic individuals where body image concerns are strongly associated with disordered eating behaviour, it was anticipated that the same association would be found in autistic women and girls.

Participants

Participants in this online study included 42 autistic young people and 54 non-autistic young people, aged 16 to 24 years. Inclusion criteria were proficiency in reading and writing English. Participants were excluded if they were in treatment or on a waitlist for treatment for any feeding or eating disorder. Although recruitment targeted individuals who reported both female sex and identified as a woman, participation was not restricted if participants reported either female sex or that they identified as a woman. Following data integrity checks, data cleaning, and matching, the final sample was comprised of 37 autistic participants and 37 non-autistic participants. Participants were matched on chronological age, such that each autistic participant had a non-autistic participant within a maximum of nine months of their age. Participants were on average 21.09 years old ($SD = 2.11$), and participant age did not differ between autistic and non-autistic groups, $t(72) = -.93, p = .42$.

Most of the autistic participants (76%; $n = 28$) had received an autism diagnosis from a registered health professional. The mean age of diagnosis was 16.5 years ($SD = 6.49$, range: 3-24). The remaining nine autistic participants (24%) self-identified as autistic, three of whom were undergoing or on a waitlist for an autism assessment at the time of participation. The inclusion of formally diagnosed and self-identified participants is consistent with other research in this area and allows for acknowledgement of the barriers many individuals face due to the

prohibitive diagnostic process (Overton et al., 2023). Eight autistic participants had previously been diagnosed with an eating or feeding disorder, which at the time of participation was in remission. Eating/feeding disorder diagnoses included ARFID ($n = 1$), Unspecified Feeding or Eating Disorder ($n = 2$), Atypical Anorexia ($n = 1$), Binge Eating Disorder ($n = 1$), and not specified by participant ($n = 3$). Interestingly, although not all participants were able to provide the exact age of diagnosis for their eating/feeding disorder, nearly all had received their autism diagnosis after their feeding or eating disorder diagnosis (eating/feeding diagnosis before autism: $n = 6$; autism diagnosis before eating/feeding disorder: $n = 1$; unknown: $n = 1$). Demographic characteristics for participants are included in Table 4.1.

Table 4.1

Demographic Information

Characteristic	Non-Autistic Group		Autistic Group	
	<i>n</i>	%	<i>n</i>	%
Gender				
Woman	37	100	30	81
Nonbinary	0	0	3	4.1
Agender	0	0	2	5.4
Prefer to self describe	0	0	2	5.4
Sex assigned at birth				
Female	37	100	36	97.3
Male	0	0	1	2.7
Racial/ethnic group ^a				
Black	1	2.7	2	4.9
East Asian	1	2.7	2	4.9
Southeast Asian	2	5.4	2	4.9
Indigenous	0	0	1	2.4
Latino/Latinx	3	8.1	3	7.3
Middle Eastern	2	5.4	0	0
South Asian	10	27	1	2.4
White	17	45.9	26	63.4
Another race/ethnicity	1	2.7	4	4.9
Country				
Canada	35	94.6	7	18.9
United Kingdom	0	0	5	13.5
United States	0	0	13	35.1

Other	1	2.7	12	32.4
Missing	1	2.7	0	0
Annual household income				
Under \$20,000	10	27	7	18.9
\$20,000-\$49,999	2	5.4	8	21.6
\$50,000-\$74,999	2	5.4	3	8.1
\$75,000+	14	37.8	6	16.2
Prefer not to say	9	24.3	13	35.1
Employment				
Working for pay	10	27	10	27
Attending school	27	73	22	59.5
At-home parent	0	0	1	2.7
Volunteering	0	0	2	5.4
Missing	0	0	2	5.4
Psychiatric diagnoses ^b				
ADHD/ADD	4	10.8	11	29.7
Anxiety	6	16.2	29	78.4
Depression	5	13.5	22	59.5
Learning disability	0	0	3	8.1
Eating/feeding disorder	0	0	8	21.6
Sleep disorder	0	0	6	16.2
Substance use disorder	0	0	2	5.4
Other	1	2.7	3	8.1

Note. $N = 74$ ($n = 37$ for each group).

^a Participants were able to select more than one category. ^b Includes previous and current diagnoses.

Measures

Eating Problems

Eating problems were measured using multiple instruments to capture the heterogeneity of problems. First, the Eating Concern subscale from the Eating Disorder Examination Questionnaire (EDE-Q), Sixth Edition (Fairburn & Beglin, 1994) was used. The EDE-Q is one of the most used measures of eating pathology (Kling et al., 2019) and can generate subscale and global scores by averaging item responses. Higher scores indicate greater eating disorder pathology. A cut-off score of 4 on the global or subscale scores is commonly used to indicate clinical significance (Carter et al., 2001; Luce et al., 2008). This measure has been used across a wide age range and its use in adolescents and young adults is supported by numerous studies

examining the scale's psychometric properties (Berg et al., 2012; Rand-Giovannetti et al., 2020). Two subscales (eating concern and restraint) and the global score were used in the analyses. The Eating Concern subscale includes five items and measures aspects of preoccupation with eating, fear of losing control over eating, and the social context of eating. In the current study, this subscale was found to have good internal consistency ($\alpha = .82$). The Restraint subscale also includes five items which measure eating restraint and avoidance, rules around eating, and desire to have an empty stomach. The internal reliability of the restraint subscale was good ($\alpha = .86$) in this study. The global scale demonstrated excellent internal consistency in the present study ($\alpha = .93$). In addition to the formal scales, key behavioural indicators of disordered eating were also examined, that is, the proportion of individuals in each group who reported engaging in objective binge episodes (defined as eating an abnormally large amount of food and experiencing a loss of control over eating), excessive exercise, dietary restraint, self-induced vomiting, and laxative misuse.

The Eating Disturbances in Youth-Questionnaire (EDY-Q; Kurz et al., 2015) was used to assess for ARFID symptoms. The EDY-Q is a 14-item self-report instrument with items based on the diagnostic criteria for ARFID and other feeding or eating disorders (e.g., pica, rumination disorder, selective eating). This measure has been validated in samples of children aged 8 to 13 years and has demonstrated acceptable internal consistency and evidence of convergent and divergent validity (Hilbert & Van Dyck, 2016). Only one study has examined how the measure performs in adults from a community sample; Hilbert and colleagues (2021) found evidence for factorial, divergent, and discriminant validity. However, because of the small number of items per subscale and the heterogeneity between content subscales, low inter-item and item-total correlations were found. The authors suggested the measure may not be best suited for subscale

analysis but found that the measure's total mean score measuring restrictive eating behaviours (but not shape and weight concern) showed good divergent validity between restrictive eating related to ARFID and global eating disorder psychopathology. In line with Hilbert et al. (2020), the total mean score included the 10 items that did not assess for body image concerns, pica, or rumination disorder. This total mean score served as a measure of restrictive eating and showed good internal consistency ($\alpha = .83$) in the present study. To calculate ARFID symptoms, three items assessing food avoidance and restriction, one item measuring the presence of low weight, and the two items measuring weight and shape concern were used. The items measuring food avoidance/restriction and low weight were required to be endorsed at least often (≥ 4), while the shape and weight concern items were required to be reported less than sometimes (< 3 ; Hilbert et al., 2020). Participants who met these criteria were considered to show symptoms potentially indicative of ARFID.

Last, as previously discussed, autistic people may experience disordered eating problems that differ from their non-autistic peers. As a result, it is possible that measures created for and standardized in the general population do not appropriately capture the eating problems experienced by autistic people. The Swedish Eating Assessment for Autism Spectrum Disorders (SWEAA; Karlsson, et al., 2013) is, to our knowledge, the only autism-specific measure of eating pathology. The SWEAA was originally designed and validated as a self-report measure for autistic people with "normal intelligence" aged 15 to 25 years (Karlsson et al., 2013). This measure has demonstrated high levels of reliability (e.g., internal consistency of .931 for parent-report and .899 for self-report; Bitsika & Sharpley, 2018) and validity (e.g., high construct validity; Karlsson et al., 2013). The SWEAA was completed by both autistic and non-autistic participants. The internal consistency of all items for this measure in the present study was

excellent ($\alpha = .94$). Differing methods have been used to calculate scores on the SWEAA (Schröder et al., 2022). For the present study, items were administered following the developers' instructions with responses ranging from 1 (never correct) to 5 (always correct). Items were added together and divided by the number of items to create mean subscale scores, which were then transformed such that the lowest possible score was 0 and highest possible score was 100. The total score reflects the mean of the subscale scores.

Body Image

Multiple measures were used to assess various dimensions of body image. Specifically, the EDE-Q Shape and Weight Concern subscales, the Body Checking Questionnaire (BCQ; Reas et al., 2002), the Body Image Avoidance Questionnaire (BIAQ; Rosen et al., 1991), and the Body Image Importance subscale of the Body Image and Body Change Inventory (Ricciardelli & McCabe, 2002) were used. Additional information about these measures, including each a description of scale's psychometric properties can be found in Chapter 3 of this dissertation.

Open Response

Following completion of the previously described measures, participants were also invited to share any additional information about their body image, eating, and weight-control behaviours.

Procedure

The study received approval from the institution's research ethics board and recruited participants through social media platforms (Facebook, Reddit, Twitter), community clinics and autism-specific organizations, as well as the institution's undergraduate research participation system. Prospective participants were required to contact researchers to express their interest in the study and confirm eligibility requirements before receiving a link to complete the survey on

Qualtrics. To confirm their capacity to consent, participants had to answer multiple choice questions related to the study objectives and consent process. Participants were required to answer 7 out of 8 capacity questions correctly to be considered eligible. The survey took approximately 40 minutes, and participants could complete it at their own pace. Upon completion, participants were compensated with a \$10 Canadian online gift card and given access to resources that promote a positive relationship with their body and educate them on eating disorders and body image issues.

Data Analysis

Data was analyzed using SPSS Version 28. Prior to analysis, variables were checked for accuracy of data entry, missing values, and normality. The variables were examined separately for the two groups. Two cases from the autistic group and one case from the non-autistic group were deleted due to considerable missing data. There was minimal missing data within the remaining sample; where missing data was present, scores were calculated following test-developers' recommendations (e.g., totals computed for EDE-Q subscales if at least half of a subscale's items were completed; Fairburn, 2008). After addressing missing data and age matching, 37 participants remained in each group. One univariate outlier was identified in the non-autistic group on the eating concern variable and was winsorized to within normal range. No outliers were identified in the autistic group.

Results

Table 4.2 shows the mean and standard deviation for the study variables and subscales from each measure. Across all measures higher scores indicate greater challenges.

Table 4.2

Descriptive Statistics for Continuous Study Variables

	Non-Autistic Group		Autistic Group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
SWEAA Subscale				
Perception	24.8	15.6	47.2	16.2
Motor control	14.3	13.1	25.7	16.7
Purchase of food	22.2	18.4	50.2	21.8
Eating behaviour	25.7	14.3	45.0	17.2
Mealtime surroundings	12.2	15.8	45.6	18.2
Social situation at mealtime	34.6	12.8	47.4	13.2
Other disordered eating behaviours	9.6	10.4	16.9	13.1
Hunger/satiety	25.7	23.9	50.7	26.7
Simultaneous capacity	10.8	18.2	45.3	33.3
Pica	4.1	12.5	10.1	19.1
EDY-Q Subscale				
Food avoidance emotional disorder	2.9	3.2	6.4	4.6
Underweight	2.2	2.8	2.6	3.9
Weight and shape concern	3.9	3.3	4.1	3.5
Selective eating	3.2	4.2	10.1	5.8
Functional dysphagia	1.1	1.9	2.5	3.4
Pica	0.1	0.5	0.4	0.8
Rumination	0.1	0.5	0.3	0.9
EDE-Q Subscale				
Eating Concern	0.8	1.2	1.5	1.5
Restraint	0.7	1.0	1.6	1.4

Elevated Eating Concerns

The first research question sought to characterize eating and weight related behaviours of autistic women and girls relative to their non-autistic peers. To this end, the prevalence of elevated eating problems was examined, or scores that may be indicative of a clinically significant eating problem. Table 4.3 includes the number of individuals from each group who exceeded the threshold indicative of potential problems. More eating problems were reported in the autistic group than the non-autistic group, with particularly high rates of ARFID symptoms and substantially higher rates of general eating pathology among the autistic participants. Table 4.4 displays the proportion of participants from each group who reported engaging in disordered eating behaviours. For nearly all disordered eating behaviours, more autistic participants reported

at least one occurrence of each behaviour (the exceptions being excessive exercise and self-induced vomiting where a higher proportion of the non-autistic group endorsed any occurrence of these behaviours). Additionally, more autistic participants reported regular occurrence of disordered eating behaviours, except for excessive exercise, where 5.4% reported regular occurrence in both groups.

Table 4.3

Prevalence of Eating Problems

Characteristic	Non-Autistic Group		Autistic Group	
	<i>n</i>	%	<i>n</i>	%
EDE-Q Global Score ^a	1	2.7	5	13.51
Elevated Eating Concern ^a	1	2.7	3	8.1
Elevated Restraint ^a	2	5.4	4	10.8
ARFID Symptoms ^b	0	0	6	16.2

^a EDE-Q score ≥ 4 . ^b EDY-Q ARFID criteria indicated.

Note. SWEAA data excluded from table as it does not have well established cut-offs indicative of the presence of problems.

Table 4.4

Proportion of Participants Engaging in Disordered Eating Behaviours

Behaviour	Non-Autistic Group		Autistic Group	
	Any Occurrence (%)	Regular Occurrence (%)	Any Occurrence (%)	Regular Occurrence (%)
Objective Binge Episodes	29.7	16.2	37.8	24.3
Excessive Exercise	32.4	5.4	21.6	5.4
Dietary Restraint	13.5	5.4	18.9	8.1
Self-Induced Vomiting	5.4	0	2.7	2.7
Laxative Misuse	2.7	0	5.4	2.7

Note. Regular occurrence for excessive exercise was defined as exercising in a driven or compulsive way as a means of controlling weight, shape, or amount of fat, or to burn off calories for ≥ 20 days over the past 28 days. Regular occurrence for dietary restraint required going for long periods of time (8 hours+) without eating anything to influence shape or weight for ≥ 13 days over the past 28 days. For all other behaviours, regular occurrence involved ≥ 4 occurrences over the past 4 weeks (Lavender et al., 2010; Luce et al., 2008).

Open Response

Interestingly, more participants from the autistic group provided additional information in response to the open-ended question about their eating or weight-related behaviours. The most salient responses from each group are presented here. In the non-autistic group, one participant described that their eating behaviours change in relation to their menstrual cycle but provided no additional information. In contrast, participants from the autistic group provided extensive reasoning for engaging in certain behaviours and provided additional context for their responses. Multiple participants described strict control over their eating and weight-control behaviours. For example, one participant described:

I eat a set amount of calories per day in order to lose weight. I don't worry about gaining weight because I know if I eat the set amount, I physically cannot gain weight. One of the reasons I enjoy calorie counting (aside from weight loss/management), is it removes the need to gauge hunger and fullness cues (which I can't do) and it gives me a routine that I find soothing, and it makes me feel less anxious knowing I have control over something.

Similarly, another participant described their history of disordered eating which began at a young age and described their continued weight-control behaviours which involve, "...an obsession with the gym and [I] am still very controlling over my eating habits. I get extreme anxiety if I cannot go to the gym 6 days a week for 1-2 hours at a time." Autistic participants also described other health-related challenges that affect their eating such as medication which impacts their hunger cues, anxiety leading to under-eating, and various challenges related to eating in public (e.g., motor control issues leading to spilling food, sensory and social difficulties in public settings).

Differences between Groups

The second research question examined whether autistic and non-autistic women and girls' scores differed on measures of eating problems. A series of independent samples t-tests were performed to examine differences between scores on several measures. To correct for multiple comparisons, a Bonferroni adjusted α level of .01 (.05/5) was used. As shown in Table 4.5, after considering the alpha correction, the autistic group scored significantly higher on all but one measure of eating problems. The effect sizes for comparison of the SWEAA Total score and EDY-Q Restrictive Eating score were found to exceed Cohen's (1988) convention for a large effect ($d = .80$), while the effect sizes were medium for the comparisons involving Eating Concern scores and Global scores from the EDE-Q.

Table 4.5

Differences Between Non-Autistic and Autistic Groups on Measures of Eating Problems

	Non-Autistic Group		Autistic Group		<i>df</i>	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
SWEAA Total	18.46	9.63	38.31	11.76	69	-7.77	<.001	-1.85
EDY-Q Restriction	.94	.74	2.17	1.36	72	-4.87	<.001	-1.13
EDE-Q Restraint	.83	1.23	1.49	1.54	72	-2.02	.047	-.47
EDE-Q Eating Concern	.72	.97	1.64	1.43	72	-3.24	.002	-.75
EDE-Q Global Score	1.35	1.08	2.17	1.43	72	-2.78	.007	-.65

Eating Problems and Body Image

To address the final research question examining the association between eating problems and body image, correlational analysis was conducted separately for each group. Tables 4.6 and 4.7 show correlations among the measures for the non-autistic and autistic groups, respectively.

Table 4.6

Non-Autistic Group Correlations between Eating Problem and Body Image Scores

Variable	1	2	3	4	5	6	7
1. SWEAA Total	—						
2. EDE-Q Global	.08	—					
3. EDY-Q Restriction	.55**	.19	—				
4. EDE-Q Weight & Shape Concern	.07	— ^a	.21	—			
5. Body Avoidance	.08	.66**	.16	.72**	—		
6. Body Checking	.15	.82**	.06	.73**	.60**	—	
7. Body Image Importance	-.03	.35*	.24	.31	.30	.46**	—

^a Correlation not calculated because subscale score is used to calculate global score.

* $p < .05$. ** $p < .001$.

Table 4.7

Autistic Group Correlations between Eating Problem and Body Image Scores

Variable	1	2	3	4	5	6	7
1. SWEAA Total	—						
2. EDE-Q Global	.14	—					
3. EDY-Q Restriction	.62**	-.03	—				
4. EDE-Q Weight & Shape Concern	.23	— ^a	.04	—			
5. Body Avoidance	.63**	.54**	.17	.59**	—		
6. Body Checking	.23**	.73**	-.09	.73**	.53**	—	
7. Body Image Importance	.20	.65**	.02	.61**	.36*	.69**	—

^a Correlation not calculated because subscale score is used to calculate global score.

* $p < .05$. ** $p < .001$.

Results indicated significant positive associations between multiple aspects of body image and eating problems in both groups. Behavioural body image (i.e., Body Avoidance and Body Checking) scores were not significantly associated with SWEAA Total scores in the non-autistic group but were weakly-to-moderately correlated with SWEAA Total scores in the autistic group. In contrast, behavioural body image scores were significantly associated with EDE-Q Global scores in both groups, with strong correlations between Body Checking and EDE-Q Global scores and moderate correlations between Body Avoidance and Global EDE-Q scores. The Weight and Shape Concern scores were not significantly associated with either measure of eating difficulties in either group.

Discussion

Considering the limited understanding of eating problems commonly experienced by autistic people, this study identified and described the diverse eating problems experienced by a community sample of autistic women and girls compared to their non-autistic peers. The differences in factors related to eating problems within each group were also examined. Relatively high rates of autism-specific eating problems in the autistic group were found. Compared to previous research using the SWEAA, autistic individuals in this study had a higher overall mean score, suggesting relatively high rates of autism-specific eating problems (total score of 38.31 in present study compared to 26.70 in Demartini et al., 2021 and 19.68 in Lundin Remnélius et al., 2022). The present sample also endorsed high rates of eating problems as measured by common eating disorder measures. In the non-autistic group, rates of elevated scores on the Eating Concern and Restraint subscales were comparable to normative data for undergraduate women (2.2% for Eating Concern and 7.9% for Restraint; Luce et al., 2008). In contrast, rates in the autistic group were much higher for the Restraint subscale, where just over 10% of participants endorsed elevated levels. These findings are consistent with previous research highlighting higher rates of AN-like behaviours among autistic people than their non-autistic peers (Brown & Stokes, 2020). The autistic group also endorsed comparatively high levels of Eating Concern compared to the non-autistic group. Considering the items that comprise the Eating Concern subscale (e.g., preoccupation with food, worry about losing control, concern about being seen by others when eating), it is possible that autism-specific factors, such as social anxiety, impulsivity, and difficulty with flexible thinking, may have contributed to elevated scores on this subscale. Notably, 13.5% of the autistic group scored in the clinically significant range on the EDE-Q Global score, indicating high levels of eating disorder pathology. Compared to the normative sample of non-autistic women and girls aged 18-25 years, nearly 3

times as many autistic participants exceeded the cut-off (5.6% scored in the clinically significant range in Luce et al., 2008). It is important to acknowledge that this normative data is likely dated, and scores may not be reflective of current levels of eating pathology in the general population; however, the rate of eating problems in the autistic group is still considerably higher than that of the comparison group, suggesting relatively high levels of eating problems among the autistic group.

High rates of symptoms of ARFID were also found in the autistic group, with 16% of the sample exceeding the criteria for ARFID symptoms. In comparison, using the same measure and scoring criteria in a community sample of adults aged 18 to 94 years, Hilbert and colleagues (2020) found a point prevalence of 0.8% for ARFID symptoms in their female participants. This finding suggests that ARFID may occur at much higher rates in autistic populations; however, little is known about the co-occurrence of ARFID and autism. In a recent scoping review, Bourne et al. (2022) found only two studies that reported on the overlap between diagnosed ARFID and autism. Most studies included examined the overlap between restrictive eating consistent with features of ARFID and autism. As a result, these authors suggested that ARFID is likely to be a highly prevalent and impactful problem for autistic people (Bourne et al., 2022).

Regarding the disordered eating behaviours participants engaged in, overall, rates were fairly consistent with the normative sample for undergraduate women aged 18-25 years (Luce et al., 2008). The autistic group endorsed lower self-induced vomiting than the non-autistic group and normative sample, which is unsurprising given the uncomfortable sensory experience associated with vomiting. A considerable proportion of both groups endorsed engaging in any occurrence of objective binge episodes. Rates were particularly high in the autistic group, where nearly a quarter of participants endorsed regularly engaging in objective binge episodes.

Although to our knowledge, no research has examined the frequency of binge eating in autistic populations, the finding of higher rates than their non-autistic peers is consistent with findings from Demartini et al. (2021) who found higher rates of bulimic behaviours (i.e., bingeing and purging) in an autistic population compared to a non-autistic sample. It is conceivable that autism-specific factors contribute to binge episodes. For example, difficulty with interoception, including recognizing hunger and satiety cues, may lead to unintentional under- and over-eating. Additionally, given that emotion regulation challenges are a predictor of binge eating (Dingemans et al., 2017), autistic people's difficulty in this area may also lead to binge eating. Together, the combination of autistic traits and associated challenges likely put autistic people at higher risk of binge eating.

The hypothesis that the autistic group would score significantly higher across measures of eating problems was supported. As expected, the autistic group scored significantly higher on the SWEAA, an autism-specific measure of eating problems. This finding is consistent with previous research comparing autistic and non-autistic groups on this measure (e.g., Demartini et al., 2021; Karlsson et al., 2013). In addition, the autistic group also scored significantly higher on both the EDE-Q and EDY-Q, which measure general feeding and eating problems, suggesting they experienced higher rates of traditional feeding/eating pathology as well. The autistic group was found to experience higher rates of restrictive eating, including behaviours commonly associated with AN (e.g., limiting food intake to influence shape or weight). This finding is consistent with the considerable literature pointing towards an overlap between AN and restrictive eating disorders (e.g., Kinnaird & Tchanturia, 2021; Westwood & Tchanturia, 2017).

Regarding the final hypothesis where it was anticipated that body image concerns would be significantly positively associated with eating problems in both autistic and non-autistic

women and girls, the hypothesis was only partially supported. The findings demonstrate that certain aspects of body image may differentially impact eating problems between groups. Specifically, behavioural body image was significantly associated with overall autism-specific eating problems in the autistic group, but not the non-autistic group. Conversely, behavioural body image was correlated with overall scores on a common measure of eating pathology in both groups, with slightly weaker associations in the autistic group. Although neither instrument (EDE-Q or SWEAA) directly measures behavioural body image, it may be that the behaviours associated with behavioural body image (i.e., body checking, avoidance) are more associated with autism-specific eating problems. However, given the preliminary nature of this finding, additional research is required to understand this relation. Other than behavioural body image, no other aspects of body image and eating problems were markedly different between groups. Of note, weight and shape concern scores were not significantly associated with either measure of eating problems. This finding is unsurprising considering both measures (SWEAA and EDY-Q) examine feeding/eating problems that are thought to not be driven by weight and shape concerns, such as autism-specific eating problems and ARFID. Open responses from participants provided additional context for their eating behaviours and related concerns. Consistent with quantitative findings, several participants described strict control over their eating and weight-related behaviours and a pre-occupation with eating and food.

Limitations and Future Directions

Results from the present study should be interpreted considering several study limitations. The first limitations concern the sample; the autistic participants included represent a portion of the autistic population who can read, write, and communicate proficiently. As such, the results may not generalize to autistic people with higher support needs and lower levels of

reading, writing, and communication skills. Concerning sample recruitment, participants self-selected into the study, which may have led to selection bias, resulting in a higher than average number of participants who experience eating problems. Additionally, although the sample was adequately powered for the comparisons conducted and steps were taken to minimize inflated error, the sample size was fairly small. The combination of a relatively small sample and possible selection bias means that some of the rates of eating problems may have been inflated. Future research should aim to recruit a larger sample of participants across a range of settings to help reduce both selection bias and potentially inflated prevalence of eating problems. A related limitation of the current study concerns the differing recruitment methods between groups. Specifically, the autistic group was largely recruited via social media whereas the non-autistic group was almost exclusively recruited from an existing pool of undergraduate psychology students. Future research may benefit from using similar recruitment strategies for autistic and non-autistic participants to further limit potential differences between groups. Additional limitations concern the methods; feeding or eating disorders were not directly assessed for, so whether participants had an active feeding or eating disorder at the time of participation cannot be determined. For future research, taking steps to ensure participants do not have an active disorder would provide a better representation of eating problems in a non-clinical sample. Next, medication use was not accounted for in the analyses; several participants in both groups reported that they had previously taken or were currently taking a number of psychiatric medications, many of which have effects on appetite, energy levels, and weight changes. Future research incorporating the role of medication use in understanding eating and feeding concerns would be informative. Finally, because of the measures used to assess for body dissatisfaction and general eating pathology (the EDE-Q Weight and Shape Concern subscales and the EDE-Q

Global score, respectively), associations between body dissatisfaction and general eating problems could not be examined. Inclusion of an additional measure of traditional eating pathology would have helped to further elucidate the relation between autistic people's body image and eating problems.

Conclusion

Despite the limitations, the present study is one of the first to examine a wide range of disordered eating behaviours in autistic women and girls, and includes data on behaviours that have previously been under-researched in this population. Overall, the results suggest that autistic women and girls experience more eating problems than their non-autistic peers. Particularly high rates of binge eating and ARFID were found in the present sample. The results are consistent with previous research suggesting that autistic people experience both autism-specific eating behaviours (e.g., selective eating, preference for certain routines around food) as well as eating pathology seen in the general population (e.g., binge eating, restriction of food to influence weight or shape). It is likely that many of the eating problems autistic people experience are influenced by a combination of autism-specific factors (e.g., strict adherence to routine; difficulty with interoception) as well as traditional body image concerns. Clinically, these findings highlight the importance of assessing for a wide range of eating problems and taking an intersectional approach to understand how each individual's autistic traits, associated challenges, food/eating preferences, and feelings about their body interact.

Chapter Conclusion

The manuscript presented in this chapter significantly added to the sparse literature examining feeding and eating problems in autistic young people. The autistic group was found to experience high rates of feeding and eating challenges. Results from this chapter also highlighted

the autism-specific factors that influence autistic people's eating and weight-control behaviours. These findings built on the findings from the previous chapter where some autistic participants described autism-specific body image concerns. The final chapter in this thesis will summarize results across the three manuscripts included and present a general discussion including limitations and directions for future research.

CHAPTER FIVE: General Discussion and Conclusion

Summary of Research Findings

This thesis advances the field's understanding of the overlap between autism and eating/feeding problems by providing novel information about the experience of body image in autistic women and girls. Chapter 2 presented a review of feeding and eating problems in autistic young people and found that such problems affect a substantial number of autistic people (rates ranged from 6.7% to 83% of participants, with variation depending on the problem being measured). Food selectivity was found to be one of the most common feeding problems that autistic young people experience, while only three studies examined the presence of weight or shape concerns in autistic populations. At the time of publication (2021), despite body image disturbance being an important feature of eating disorders, research on body image in autistic young people was virtually non-existent. A recent scoping review confirms these findings; Longhurst (2023), reviewed the literature and identified only eight studies that either examined body image in autistic people or examined the relation between aspects of body image and autism or autistic traits. The author concluded that although the research points to a significant relationship between indices of negative body image and autistic traits, the research is not robust due to the limited number studies and conflicting results. Further, the author calls for additional research, particularly in autistic community samples.

Chapter 3 aimed to fill the gap in the literature by comprehensively measuring multiple aspects of body image in a sample of autistic (self-identified or diagnosed) women and girls and comparing their experience to an age-matched sample of non-autistic women and girls. Autistic participants were found to have relatively high rates of body dissatisfaction and the autistic group had significantly higher attitudinal body image concerns than the non-autistic group. Novel insight was also provided through presenting several participants' description of what impacts

their experience of body image and suggested that there may be additional factors, such as gender and sensory differences, that influence autistic people's body image. The finding that body image is more nuanced for autistic people has been suggested previously (Brede et al., 2020). Longhurst (2023), proposed three autism-specific factors that influence negative body image: sensory difficulties related to body image (e.g., bloating leading to negative body image), social isolation or feeling different, and interpreting information in a way that lacks flexibility. Notably, all three of these factors were present within the open responses from participants in the current study.

The findings related to body image were built on in Chapter 4 by first measuring the occurrence of multiple types of feeding and eating problems in the sample, then examining the associations between body image and eating problems. As expected, the autistic group had higher scores than the non-autistic group on all measures of eating problems. Consistent with previous research (e.g., Schröder et al., 2022), the autistic group experienced relatively high rates of autism-specific eating problems and eating pathology often seen in the general population such as binge-eating. Despite relatively high rates of eating problems, only behavioural body image was correlated with the measures of autism-specific eating problems and general eating pathology. This is consistent with previous literature that has produced conflicting evidence regarding the extent to which autistic people experience negative body image and whether their body image problems are relevant to eating problems. As discussed previously, Brede et al. (2020) found that body image problems were less relevant to autistic people's eating pathology. In contrast, two studies have shown that autistic people's body image problems are associated with significant distress and poorer quality of life (Healy et al., 2021; Jachyra et al., 2019). Together, findings from this chapter suggest that the relation between body image concerns and

eating problems is ambiguous, but that, like body image, the eating problems experienced by autistic people are likely influenced by additional factors beyond what their non-autistic peers experience.

Broadly, findings presented across the three papers suggest that feeding and eating problems and body image concerns in this population are common, complex, and multifaceted. The present findings suggest that, in contrast to previous research in this area (e.g., Babb, 2022), shape and weight concerns are prevalent in this group, but how these concerns relate to disordered eating remains unclear. Given the suggestion of more nuanced reasons behind body image issues in this population, more research is required to further disentangle the relation between body image concerns and feeding and eating problems in autistic people.

Limitations and Future Directions

In addition to the limitations presented in Chapters 3 and 4, several additional limitations are important to consider. The first limitation relates to the measurement of body image concerns and eating problems in autistic people. Researchers have found that in other mental health concerns such as anxiety and suicidality, commonly used measures do not accurately capture the essence of the concern being measured (e.g., Howe et al., 2020) and autistic people do not interpret questions in the way intended by measure designers (Cassidy et al., 2020; Rodgers & Ofield, 2018). This pattern was somewhat evident in the current study when examining the open responses from participants where several participants provided alternative reasons for endorsing certain challenges. For example, one participant endorsed behaviours related to body avoidance such as wearing baggy clothes but stated that the reason they engage in this behaviour is due to sensory discomfort rather than concern over being confronted with their body shape or weight, as the measure developers intended. This was also evident in the measurement of eating problems

where participants may have endorsed high levels of strict control over their eating but gave reasoning related to difficulty with hunger and satiety cues rather than the strict control serving to control their weight. Taken together, this pattern of different reasons for endorsing behaviours suggests that the scores obtained on the quantitative measures within this study may not accurately reflect what they are intended to measure. Developing or modifying existing measures of body image and eating problems that are sensitive to the reasons autistic people engage in certain behaviours may be warranted.

Several additional limitations relate to the sample of the present study. The participants included within each group were fairly homogenous in their race/ethnicity, geographic location, and gender identity. Most of the autistic sample was White, with small numbers of participants from multiple other racial/ethnic groups. While there was slightly more diversity within the non-autistic group which had nearly half of the group identify as White and over a quarter of participants identify as South Asian, the group was still not representative of the Canadian or global demographic. Likewise, both groups were comprised of people living predominately in Western cultures, so results likely do not generalize to other cultures. Regarding gender identity, as discussed previously, the present study focused recruitment on cis-gender women but did not exclude interested participants who were either assigned female at birth or identified as a woman. Although this was an intentional choice since much more is known about the presentation of body image and eating problems in women than men and gender diverse people, the results do not represent a significant proportion of the population. Autistic people and people with eating disorders both represent groups with high rates of gender diversity (Breton et al., 2023; Øien et al., 2018; Pecora et al., 2020), so understanding the relation between autism, body image, and feeding/eating problems in gender diverse people is critical. Further, because the

sample did not include men, the findings may not be representative of autistic men's experiences. Body image develops differently in boys and men than in women and girls (Lacroix et al., 2023), often with more emphasis on drive for muscularity (Baker et al., 2019), and they may experience different feeding and eating problems (Kinasz et al., 2016). As such, additional research involving autistic men is required to determine whether the same factors impact their body image and feeding/eating problems. Altogether, future research should prioritize inclusion of people from minoritized and historically under-represented groups. One additional limitation related to the sample is the difference in psychiatric diagnoses between groups. As mentioned previously, the autistic group reported many more psychiatric diagnoses than the non-autistic group. Although this is somewhat representative, given higher rates of mental health challenges in autistic people (Lai et al., 2019), the particularly high rates of anxiety and depression in the autistic group are a concern. Considering that anxiety and depression were not measured or controlled for in the analyses, it is unclear how this impacted the results. Additional research is required to understand how other mental health concerns such as anxiety and depression might influence eating pathology and body image concerns in autistic people.

The inclusion of individuals who self-identify as autistic but have not received a formal diagnosis from a health professional deserves attention, although whether this represents a limitation or a strength of the current study is debatable. Researchers have found that individuals who self-identify as autistic have a reasonably accurate recognition of autism and autistic traits (Overton et al., 2023), suggesting that the self-identified and formally diagnosed autistics included in the current study may not represent distinct groups. Additionally, the inclusion of self-identified autistics represents a step towards neurodiversity-affirming research. However, some researchers have argued that individuals who self-diagnose may represent a distinct

subgroup from those who receive a formal diagnosis at a young age (e.g., Frith, 2021). Further, without a formal diagnosis, it is possible that some of the self-identified individuals included in autistic group may not actually be autistic, but may have another, more appropriate diagnosis. As a result, the inclusion of individuals who had not received a formal autism diagnosis may have introduced additional heterogeneity into the autistic group and influenced the findings of the current study. Additional research is needed to determine whether there are differences between self-identified and formally diagnosed autistics.

Finally, this study took a pathologizing view of body image and eating problems; however, research indicates autistic people experience positive body image as well (Walker et al., 2020). Additional research should be conducted taking a more comprehensive view of body image that includes autistic people's experience of positive aspects of body image. Additionally, research aimed at understanding the adaptive ways autistic people use eating and their relationship to food would provide a more balanced landscape of this topic. This recommendation is in line with recent calls to incorporate the neurodiversity paradigm to move away from solely deficit-based approaches to autism research (Pellicano & den Houting, 2022). Understanding the positive aspects of body image and eating in autistic people may also help to inform prevention and intervention efforts by considering how to promote body neutrality and appreciation within this population.

Clinical Implications

Findings from this study have several important clinical implications. First, the finding of nuanced experiences of body image in autistic women and girls highlights the need for clinicians to take an individualized approach to each patient. Understanding what factors – autism-specific or otherwise – affect their body image is critical for developing appropriate treatment goals.

Additionally, understanding if and how clients experience body dissatisfaction can help differentiate between feeding and eating problems, such as ARFID and AN. Similarly, it is also important for clinicians to work with their autistic patient to understand what factors may drive their feeding and eating behaviours. Importantly, this work needs to be done in a way that recognizes that autistic people cannot remove the impact of their autistic traits from their other experiences or challenges. For example, if hypersensitivity to bodily experiences such as bloating contributes to a preoccupation with shape or weight, the hypersensitivity will need to be accommodated within treatment rather than remediated. Clinicians should partner with autistic patients to set goals that are sensitive to their autism-specific experiences of body image and eating problems.

The findings of high rates of disordered eating in the autistic group highlight the need for greater understanding of autistic people's feeding and eating problems at both the clinical and subclinical level. In general, care for an eating disorder is inaccessible for many people (Regan et al., 2017). For autistic people, such care is further inequitable because of clinicians' lack of knowledge about autism (Kinnaird et al., 2017). Resources to inform clinicians about working with autistic people with eating and feeding problems are urgently needed. As well, resources for autistic people to better understand their own feeding and eating behaviours and to help guide them to seek care when necessary would be beneficial. Some organizations in the United Kingdom (e.g., PEACE Pathway, Neurodiversity, Eating Disorders and Disordered Eating [NEDDE]) have begun to provide this education, but additional resources are required to make this information more accessible.

The finding that most of the participants in the current study who previously had an eating disorder received their autism diagnosis after their eating disorder diagnosis points to the

urgent importance of increasing clinician's understanding of how autism presents, especially in women and girls. Additionally, given the psychiatric complexity in the current sample, many of the participants had received extensive care and been given multiple alternative diagnoses before receiving their autism diagnosis. This is consistent with previous research highlighting how treatment providers often do not notice that symptoms women and girls present with may be related to autistic traits, and instead diagnose and treat other mental health concerns (Bargiela et al., 2016). Given the high overlap between feeding/eating problems and autism highlighted in the current and previous studies, it is critical that health care professionals (and particularly eating disorder treatment providers) understand how autism presents in women and girls to ensure timely diagnoses and supports.

Conclusion

Autistic women and girls experience significantly more body dissatisfaction and feeding/eating problems than their non-autistic peers. However, the body image and feeding/eating problems experienced by autistic people are likely more nuanced than their non-autistic peers, as they involve autism-specific influences such as sensory difficulties, a feeling of being different, and difficulty with flexible interpretation of information. The relation between body image and eating behaviours in this population is complex and multifaceted. Consideration needs to be given to how each individual's autistic traits affect their experience of body image and eating. Understanding the autism-specific factors that affect each patient's body image and feeding/eating behaviours will help ensure treatment goals are appropriate and inform accommodations that will be required in the treatment setting. Altogether, treatment must involve clinicians partnering with their autistic patients to better understand the complex and

multifaceted relation between autism-specific factors, body image, and feeding and eating behaviours.

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APPENDIX

Author Letters of Permission

Co-Author Permission to Include Manuscript in Dissertation

Jessica Baraskewich [REDACTED]

Fri 2023-07-14 10:42 AM

To: Carly McMorris <[REDACTED]>; Adam McCrimmon <[REDACTED]>; Kristin von Ranson <[REDACTED]>

Hi all,

Hope you're all doing well!

I'm preparing to submit my finalized dissertation to FGS and one piece they require is documentation that all co-authors have provided permission for published manuscripts to be included in the dissertation.

Please reply to this email to indicate whether you give permission for me to include the following manuscript in my dissertation:

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1519. <https://doi.org/10.1177/1362361321995631>

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Please let me know if you have any questions or concerns. I'll also be in touch in the coming weeks about moving forward with publishing the other two papers included in the dissertation!

Thank you!

Jessica

Re: Co-Author Permission to Include Manuscript in Dissertation

Adam McCrimmon [REDACTED]

Fri 2023-07-14 10:43 AM

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Hi Jessica,

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Adam

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Fri 2023-07-14 11:21 AM

To: Jessica Baraskewich [REDACTED]; Carly McMorris [REDACTED]; Adam McCrimmon [REDACTED]

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Tue 2023-07-18 6:58 AM

To: Jessica Baraskewich [REDACTED]; Adam McCrimmon [REDACTED]; Kristin von Ranson [REDACTED]

Thanks Jessica.

I also give my consent to include the publication in your dissertation.

Best,
Carly

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Information

Authors



[Autism](#)

Volume 25, Issue 6

Pages: 1505 - 1519

Article first published online: March 2, 2021

Issue published: August 2021



Keywords

[autism spectrum disorders](#), [children and youth](#), [eating disorders](#), [feeding disorders](#),

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