

Mealtime Behaviour Problems and its Association with Behavioural Problems in Preschool and Elementary Children with Autism Spectrum Disorder (ASD)

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Abstract

Mealtime behaviour problems are one of the most prominent concerns associated with autism spectrum disorder (ASD) in children. Few researchers have described mealtime behaviours and feeding issues, and their relationship with the diagnosis of ASD, its symptoms, and the surrounding environment has rarely been examined. **Objective:** To explore Saudi parental reports of common mealtime behaviour problems in children with ASD with the help of an established tool for measuring mealtime behaviour problems in children with ASD. **Method:** This study was a descriptive cross-sectional study that utilized the Brief Autism Mealtime Behaviour Inventory (BAMBI) and the Strengths and Difficulties questionnaire (SDQ) to collect data. **Results:** The study included 57 parents of children with ASD aged 4–12 years. The findings revealed that children with ASD in The Kingdom of Saudi Arabia (KSA) do not generally display excessive behaviour problems, and there is no significant association between mealtime behaviour problems and general behaviour problems in children with autism in KSA. **Conclusion:** Feeding behavioural problems do exist in children with ASD. Understanding these behaviours could be the first step to designing suitable interventions to inform and educate children and their parents about healthier mealtime habits which could decrease parental distress.

Keywords: Autism Spectrum Disorder, Mealtime behaviour problems, Problem behaviours, Food selectivity.

المشاكل السلوكية اثناء تناول الوجبات وارتباطها بالمشكلات السلوكية لدى اطفال اضطراب طيف التوحد بالروضة والمرحلة الابتدائية

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المستخلص

تعتبر المشكلات السلوكية اثناء وجبات الطعام من أكثر الاهتمامات السائدة المرتبطة باضطراب طيف التوحد عند الأطفال. وقد وصف عدد قليل من الباحثين السلوكيات اثناء اوقات الوجبات ومشكلات التغذية و نادراً ما قد فحصوا علاقتها بتشخيص اضطراب طيف التوحد وأعراضه والبيئة المحيطة. الهدف: استكشاف آراء اولياء الامور السعوديين عن المشاكل السلوكية الشائعة اثناء اوقات الوجبات للأطفال ذوي لتوحد باستخدام أداة مقننة لقياس المشكلات السلوكية اثناء وجبات الطعام لدى الأطفال ذوي التوحد. الطريقة: كانت هذه الدراسة عبارة عن دراسة مستعرضة وصفية استخدمت المقياس الموجز للسلوكيات اثناء الوجبات لدى ذوي التوحد (BAMBI) واستبيان نقاط القوة والصعوبات (SDQ). النتائج: شارك في الدراسة سبعة وخمسون ولي امر لأطفال من ذوي التوحد. وكشفت الدراسة أن الأطفال ذوي

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التوحد في المملكة العربية السعودية لا يظهرون بشكل عام مشاكل سلوكية مضطربة ولا توجد علاقة كبيرة بين المشكلات السلوكية أثناء تناول الطعام والمشكلات السلوكية العامة لدى الأطفال ذوي التوحد في المملكة العربية السعودية. الخلاصة: توجد مشكلات سلوكية متعلقة بالتغذية لدى الأطفال ذوي التوحد وأن فهم هذه السلوكيات يمكن أن يكون الخطوة الأولى لتصميم التدخلات المناسبة لإعلام وتثقيف الأطفال وأولياء أمورهم حول العادات الصحية لتناول الطعام والتي يمكن أن تقلل من الضغوطات على الوالدين. الكلمات المفتاحية: اضطراب طيف التوحد، مشكلات الوجبات السلوكية، المشكلات السلوكية، انتقائية الطعام.

Introduction and Literature Review

Mealtime behaviour problems are one of the most prominent concerns associated with autism spectrum disorder (ASD) in children (Vissocker et al., 2015). Many children with ASD suffer from associated behavioural problems that have a major effect on their performance at home and at school (Castro et al., 2016; Lecavalier et al., 2006). There is increasing interest among parents of children with ASD about mealtime behaviours and problems (Lukens & Linscheid, 2008). This is because children with ASD display more mealtime behaviour problems than typically developing children (TDC), and it is predicted that 46% to 89% of people with ASD have some kind of challenging mealtime behaviour problem (Geraghty et al., 2010). In fact, the results of a meta-analysis by Sharp et al. (2013) found that children with ASD are five more times likely to have mealtime feeding behaviour problems than TDC.

Some of the widely presented mealtime behaviour problems displayed by children with ASD are preference for specific food textures, colours or smells, food refusal, and a restrictive range of foods (Bandini et al., 2010; Castro et al., 2016; Evans et al., 2012; Zimmer et al., 2012). Food selectivity is often reported in children as a source of parental distress; however, it is a bigger concern among children with developmental delays or ASD than TDC (Al-Kindi et al., 2016; Bandini et al., 2010). Accordingly, food selectivity was found to be the main mealtime behaviour problem in children with ASD (Ledford & Gast, 2006). The main reasons for food refusal in children with ASD were food appearance, food consistency and physiological dysfunction (Schreck et al., 2004). As a consequence, children with ASD are at a high risk of nutritional insufficiencies because of their

restricted diet, mealtime behaviour problems, and restricted and repetitive routines, which might lead to growth deficiency (Shmaya et al., 2015).

Dfy et al. (2016) evaluated the prevalence of mealtime behaviour problems in children with ASD in Hong Kong using the Brief Autism Mealtime Behavior Inventory (BAMBI) and found that they display many behavioural problems, among which 'limited variety' of food is the most predominant problem. They also found that there is a positive relationship between the frequency of mealtime behaviour problems and parents' perception of the mealtime behaviour as problems. Additionally, Gray and Chiang (2017) investigated mealtime behaviours in Chinese-American children and reported that almost half of the sample (48%) were not eager to try new food. In some studies, food selectivity was found to be one of the predominant mealtime behaviour problems in children with ASD. For example, Bandini et al. (2010) compared food selectivity in children with ASD and TDC and found that food selectivity is more prevalent in children with ASD and could lead to nutritional deficiencies. Moreover, Ledford and Gast (2006) systematically reviewed seven studies which included 381 children with ASD, and the results showed that food selectivity was the most significant feeding problem they experienced. Al-Kindi et al.'s (2016) study has also compared parental reports of mealtime behaviour in children with ASD compared to TDC, and they found that children with ASD display significantly more problem behaviours during mealtimes than TDC, and that food selectivity was their most predominant problem. Another important finding reported by Al-Kindi et al. (2016) was that parents of children with ASD expressed more concern about their children's behaviour than parents of TDC.

Few researchers have described mealtime behaviours and feeding issues, and their relationship with the diagnosis of ASD, its symptoms, and the surrounding environment is rarely examined. In one such rare study, Aponte and Romanczyk (2016) explored the relationship between ASD severity and feeding problems and found

that the scores for autism severity were predictive of feeding problems. Similarly, Johnson et al. (2008) studied the relationship between mealtime behaviour problems, sensory difficulties, and ASD core symptoms: They found that mealtime behaviour problems are associated with sensory difficulties, problem behaviours and repetitive, but not communication or social, behaviours (Johnson et al., 2008). Further, a study by Nadon et al. (2011) that examined differences in mealtime behaviours between children with ASD and their siblings with typical development living in the same environment found that the children with ASD had significantly more mealtime behaviour problems than their siblings.

It is evident from the studies discussed above that children with ASD experience more mealtime behaviour problems than TDC, irrespective of whether they are in a different or the same environment. Moreover, most studies found food selectivity to be the most prevalent mealtime behaviour problem in children with ASD. However, few studies have investigated the relationship between mealtime behavioural difficulties in children with ASD and parental perceptions and reports of these behaviours as problems. This is important, as display of mealtime behavioural difficulties by children with ASD may not always be perceived as a problem by the parents. There is also not enough evidence in the literature to clarify the nature of the association between sensory difficulties and mealtime behaviour problems in children with ASD, and whether these problems are a result of sensory issues or ASD core symptoms.

Statement of the Problem

Several studies have been conducted in Saudi Arabia to investigate how autism is associated with malnutrition (Oommen & AlOmar, 2020), heavy metals (Al-Farsi et al., 2013) and environmental toxins (Blaurock-Busch et al., 2011). However, the literature on feeding behaviour problems and ASD across an individual's lifespan is still scarce. In particular, the mealtime eating behaviours of Saudi children with ASD remained unexplored. In order to fill this gap in the literature, studies need to be conducted to explore mealtime feeding behaviours in children with ASD, in order to discover the problems

associated with mealtime. Even though many studies have been conducted in different countries on mealtime behaviour problems in children with ASD, it cannot be assumed that their findings are true for children in KSA, as cultural background and customs during mealtime may influence people's mealtime behaviours.

Another important aspect to consider is that many children with ASD have co-occurring behaviour problems in addition to mealtime behaviour problems, and these problems may or may not be related to problems occurring during mealtime. However, to the author's knowledge, there is limited information about how these mealtime behaviour problems are related to other behavioural characteristics and whether they are related or not in all cases of children with ASD (Johnson et al., 2008).

Questions of the Study

Q1: What are the reported mealtime behaviour problems among children with autism in KSA?

Q2: Is there a relationship between mealtime behaviour problems and problem behaviours in children with autism?

Q3: Is there any association between parental level of education and mealtime behaviour problems?

Aims of the Study

The main purpose of this study was to explore Saudi parental reports of common mealtime behaviour problems in children with ASD by using an established tool for measuring mealtime behaviour problems in children with ASD. The second aim of this study was to investigate the association between mealtime behaviour problems and behaviours problems in children with autism. This study also explores whether there is any relationship between parental level of education and mealtime behaviour problems in children with ASD.

Significance of the Study

A better perception of mealtime behaviour problems may guide professionals in the development of effective interventions for children with ASD. In addition, a complete nutritional evaluation,

including mealtime behaviour assessment, could help in preventing these problems at an early stage before they are intensified. Such an evaluation could also help in guiding parents and children to adopt beneficial mealtime behaviours that are associated with healthier outcomes. Another significant feature of this study is that it seeks to determine if there is any relationship between behaviour problems in children with ASD and mealtime behaviour problems, as an overlap of the two types of behaviours could lead to serious short- and long-term consequences and may add to the already elevated parental stress levels (Greer et al., 2007).

Definition of Terms

- Mealtime behavioural problems: ‘specific mealtime behaviour problems indicated in the literature include food cravings, food refusal, limited variety, specificity in presentation of foods (e.g. specific brands or packaging and specific utensils), grazing, disruptive mealtime behaviours, and texture specificity’ (Ahearn et al., 2001; Cornish, 1998; Lukens & Linscheid, 2008; Raiten & Massaro, 1986; Schreck & Williams, 2006; Schreck et al., 2004; Whiteley et al., 2000; Williams et al., 2000, p.343). In this study, mealtime behavioural problems refer to the behavioural problems displayed during mealtimes by children with ASD whose parents are participants in this study. These mealtime behavioural problems are specified in the statements presented in the questionnaire used to measure these behaviours (BAMBI). The items of the questionnaire are shown in Table 2.
- Behaviour problems: ‘behaviour problems such as oppositional-defiant disorder, conduct disorder and attention-deficit and hyperactivity disorder (ADHD), and emotional problems such as anxiety disorders and depression are frequently diagnosed among youths’ (Muris et al., 2003, p.1). The behavioural problems referred to in this study are related to behavioural problems displayed by children with ASD as specified in the Strength and Difficulties Questionnaire (SDQ)

and its subdomains. Further information on the SDQ is available in this article in the procedure section.

Methods

Sample

The target population for this study were parents of children with ASD living in the western region of KSA. Children with ASD who were between the ages of 4 and 12 years were identified, and their parents were contacted through the leaders of ASD voluntary support groups in the region. This study used the convenience sampling technique, and participation was voluntary. Consent to participate was obtained from the parents through a statement at the beginning of the electronic survey link.

Procedure

This study was a descriptive cross-sectional study that utilized questionnaires to collect data. Electronic links to the questionnaires were sent to leaders of the support groups so that they could forward them to the participants. The links were created using Google docs. This study used the available Arabic version of the questionnaires as it is the native language of the participants. The two questionnaires used were BAMBI by Lukens and Linscheid (2008) and the SDQ by Goodman (2001a).

BAMBI is considered to be the only validated questionnaire designed specifically to measure mealtime behaviours in children with ASD (Lukens & Linscheid, 2008). BAMBI has been previously used in different countries with different populations and in many languages, and has been found to have adequate psychometric properties (Castro et al., 2016; Gray & Chiang, 2017; Viviers, 2018). BAMBI consists of 18 items and utilizes a Likert scale for conveying the frequency of behaviours over a range of 1, which indicates *never/rarely*, to 5, which indicates *at almost every meal*. The scale consists of three subdomains with a score assigned to each subdomain, and the total score is calculated by adding the three subdomain scores. These subdomains were limited food variety (including items 10, 11, 13, 14, 15, 16, 17 and 18), food refusal

(including items 1, 2, 4, 7 and 8) and characteristics of ASD (including items 3, 5, 6, 9 and 12). This questionnaire is to be filled by parents or caregivers of children with ASD. Participants should also indicate their perception of each item: that is, whether they perceive the indicated item to be a problem or not. BAMBI showed good psychometric properties with a Cronbach's alpha value of 0.88. Further, the test-retest reliability coefficient for two applications seven months apart or $r(33)$ was 0.87 ($p = 0.01$), and inter-rater reliability showed a positive correlation or $r(16)$ of 0.78 (Goodman, 2001) ($p = 0.01$) (Lukens & Linscheid, 2008). BAMBI was translated by Omani researchers, and they validated the questionnaire in the Arabic language with a Cronbach's alpha (internal consistency coefficient) value of 0.72 (Al-Kindi et al., 2016).

The SDQ is a self-report questionnaire that is used to identify behavioural needs in children and adolescents. It can be filled out by parents or teachers. This study utilized the parents' version for children aged 4–12 years. It consisted of 25 items divided into five subscales, including emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behaviour (Goodman, 1997). Parents were asked to indicate on a 3-point Likert scale the extent to which their child shows indications of behavioural difficulties (1 = *not true*, 2 = *somewhat true*, 3 = *certainly true*). The total SDQ score is based on the sum of all subscale scores, except for the pro-social one (Goodman, 2001). The SDQ also provides a total difficulties score based on the sum of the scores for the three domains emotional symptoms, conduct problems, and hyperactivity/inattention. There are cut-off scores for each domain as well as the total difficulties that are used to determine whether the scores are indicative of normal, borderline, or abnormal range of behaviours. A normative study by Goodman (2001) on a UK sample showed good internal consistency, based on Cronbach alpha values of 0.82, 0.67, 0.63, 0.77, 0.57 and 0.65 for the total score, and the emotion, conduct, hyperactivity, peer and prosocial subscale scores respectively. The questionnaire was shown to be stable over time with a test-retest correlation co-efficient (r) of 0.62 when applied at

an interval of four to six months (Goodman, 2001). The SDQ has been translated into many languages, and all versions have been validated and widely used in many populations (Koskelainen et al., 2001; Ronning et al., 2004; Smedje et al., 1999). The Arabic version of the SDQ has been validated in two different studies and found to have good sensitivity (72%) and specificity (55%) (Almaqami & Shuwail, 2004; Alyahri & Goodman, 2006).

For the sample used this study, BAMBI had acceptable internal consistency (Cronbach's alpha = 0.76) and SDQ had excellent internal consistency (Cronbach's alpha = 0.92).

Data Analysis

Statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS) version 23.0 (SPSS Inc., IBM, Armonk, New York, USA). Results were reported as numbers and percentages for categorical variables and as mean and standard deviation for continuous variables. Cronbach's alpha was calculated for both the BAMBI scores and the SDQ scores. Pearson correlation test was used to determine the significance of the correlation between two variables, and an independent *t*-test was used to determine the significance of differences between the means of two groups. A *p* value of ≤ 0.05 was considered to indicate statistical significance. The Pearson correlation test was used to examine the correlation between BAMBI and SDQ, and an independent *t*-test was used to investigate the correlation between parental level of education and the BAMBI and SDQ scores

Results

This study included 57 parents of children with ASD, including 42 (73.7%) mothers and 15 (26.3%) fathers who responded to the surveys for 13 female children (22.8%) and 44 (77.2%) male children. The majority of the participants were married and had a bachelor's or higher degree (that is, a high level of education). The frequency distribution of the demographic data of the participants/parents is shown in Table 1.

Table 1
Demographic Characteristics of the Study Sample (N = 57)

Demographic variables	n	%
Age of the mother or father (y)		
≤30	10	17.5
31–40	25	43.9
41–50	18	31.6
>50	4	7.0
Gender of the child		
Male	44	77.2
Female	13	22.8
Gender of the father or mother		
Male	15	26.3
Female	42	73.7
Marital status of the parent		
Single	7	12.3
Married	50	87.7
Educational level of the parent		
Intermediate or lower	5	8.8
Secondary	15	26.3
University degree	33	57.9
Postgraduate	4	7.0
Occupation of the parent		
Unemployed	27	47.4
Retired	2	3.5
Government employee (military)	6	10.5
Government employee (civil)	19	33.3
Private sector	3	5.3

The mean (SD) raw score for the three domains of BAMBI were as follows: food refusal = 8.93 (\pm 2.71), limited food variety = 19.25 (\pm 3.83), features of autism = 9.75 (\pm 1.92). As can be seen, the highest mean raw score was obtained for the limited food variety domain.

The BAMBI results for participants who responded with *often* and *always* on the Likert scale are shown in Table 2. The majority of the participants reported that their children displayed mealttime behaviour problems in the limited food variety domain: Around half the children (50.9%) indicated that they disliked certain foods and would not eat them, and less than half of the children were reported

to accept or show preference for a variety of foods. In addition, more than a quarter (38.6%) of the children were reported to prefer crunchy food, and more than a quarter (28.1%) were reported to prefer sweet foods.

With regard to the autism features domain of BAMBI, it was reported that the children did not visibly display aggressive or self-injurious behaviour. Contrary to expectation, less than half (45.6%) indicated that their children were flexible about mealtime routines. However, only 21.1% were reported to remain seated during mealtimes. This implies that the majority of the children were not able to remain seated for the duration of their meal.

With regard to the food refusal domain, few children were reported to display mealtime behaviour problems. The most noted behaviour was turning the head away from food, which was reported in only 14% of the children.

Table 2
Frequency of 'often' and 'always' Responses to the Three Domains of BAMBI

Item no.		N (%)
My child....		
Food refusal		
1	Cries or screams during mealtimes	3 (5.3)
2	Turns his/her face or body away from food	8 (14.0)
4	Expels food that he/she has eaten	2 (3.5)
7	Is disruptive during mealtimes	6 (10.6)
8	Closes his/her mouth tightly when food is presented	2 (3.5)
Features of Autism		
3	Remains seated at the dining table until a meal is finished	12 (21.1)
5	Is aggressive during mealtimes	-
6	Displays self-injurious behaviour during mealtimes	-
9	Is flexible about mealtime routines	26 (45.6)
12	Refuses to eat foods that require a lot of chewing	6 (10.5)

Limited variety		
10	Is willing to try new foods	22 (38.6)
11	Dislikes certain foods and won't eat them	29 (50.9)
13	Prefers the same foods at every meal	13 (22.8)
14	Prefers 'crunchy' foods	22 (38.6)
15	Accepts or prefers a variety of foods	27 (47.4)
16	Prefers to have food served in a particular way	14 (24.6)
17	Prefers only sweet foods	16 (28.1)
18	Prefers food prepared in a particular way	10 (17.6)

Table 3 shows the percentage of parents who perceived each behaviour as a problem, the mean BAMBI total scores for those who perceived the behaviour as a problem and those who did not, and the significance of the difference between the two groups (as indicated by the P values). The mean BAMBI score was significantly higher among the 53 parents (93.0%) who perceived their child expelling food that he/she has eaten as a problem, than among parents who did not perceive it as a problem. In addition, the mean BAMBI score was significantly lower among the 15 parents (26.30%) who perceived their child's preference for crunchy foods as a problem than among parents who did not perceive it as a problem. The mean BAMBI score was also significantly higher among the 48 parents (84.2%) who perceived their child's preference for food served in a particular way as a problem, than among the parents who did not perceive this as a problem.

Table 3
Comparison of Total BAMBI Mean Scores between Parents Who Perceived Feeding Behaviours as a Problem and Those Who Did Not

Item	Question	No. of parents who perceived the behaviour as a problem n (%)	Mean BAMBI score of those who reported the problem behaviour	P values
1	Cries or screams during mealtimes	42 (73.7%)	1.71 ± 0.97	0.781
2	Turns his/her face or body away from food	38 (66.7%)	1.97 ± 1.24	0.705
3	Remains seated on the dining table until meal is finished	-	-	-
4	Expels food that he/she has eaten	53 (93.0%)	2.09 ± 0.97	0.029*
5	Is aggressive during mealtimes	39 (68.4%)	1.23 ± 0.43	0.589
6	Displays self-injurious behaviour during mealtimes	41 (71.9%)	1.07 ± 0.26	0.890
7	Is disruptive during mealtimes	46 (80.7%)	1.61 ± 1.08	0.159
8	Closes mouth tightly when food is presented	39 (68.4%)	1.62 ± 0.91	0.234
9	Is flexible about mealtime routines	-	-	-
10	Is willing to try new foods	-	-	-
11	Dislikes certain foods and won't eat them	43 (75.4%)	3.11 ± 1.24	0.344
12	Refuses to eat foods that require a lot of chewing	39 (68.4%)	1.82 ± 1.07	0.623
13	Prefers the same foods at each meal	33 (57.9%)	2.82 ± 1.36	0.478
14	Prefers 'crunchy' foods	15 (26.3%)	2.60 ± 1.12	0.034*
15	Accepts or prefers a variety of foods	-	-	-
16	Prefers to have food served in a particular way	48 (84.2%)	2.27 ± 1.38	0.016*
17	Prefers only sweet foods	35 (61.4%)	2.60 ± 1.14	0.473
18	Prefers food prepared in a particular way	32 (56.1%)	2.72 ± 1.08	0.786

Thus, the majority of parents (93%) perceived the expelling of food during mealtime to be a problem, and 84.2% of the parents perceived preference for having food served in a particular way to be a problem.

Table 4 presents the correlations between the different SDQ domain scores and the total BAMBI score, as well as the correlations between the total SDQ and total BAMBI scores. None of the correlations were significant; this indicates that mealtime behaviour problems were not associated with general behaviour problems in children with ASD in this sample.

Table 4
Correlation between BAMBI and SDQ

SDQ subdomains	Correlation with total BAMBI score Correlation coefficient <i>r</i> (p value)
Emotional problem scale	- 0.052 (p = 0.700)
Conduct problem scale	-0.037 (p = 0.785)
Hyperactivity scale	0.048 (p = 0.721)
Peer problem scale	-0.072 (p = 0.597)

Table 5 depicts the relationship between parental level of education and total BAMBI scores and the subdomain scores. Parents were considered highly educated if they have a bachelor’s or higher degree and not highly educated if they have high school or lower education.

Table 5
Correlation between Parental Level of Education and Total BAMBI Score

	Level of education (mean ± SD)		Correlation with educational groups <i>r</i>	P value
	Low level of education	High level of education		
BAMBI				
Food refusal	9.50 ± 3.35	8.62 ± 2.28	-0.156	0.245
Features of autism	10.45 ± 1.73	9.38 ± 1.93	-0.269	0.043*
Limited food variety	19.15 ± 3.65	19.30 ± 3.97	0.019	0.891
BAMBI Total	39.10 ± 5.75	37.30 ± 4.54	-0.173	0.199

Parents with high education level (bachelor’s or a higher degree) have relatively lower total BAMBI scores. However, the differences in the scores did not reach statistical significance. The mean scores for the features of autism domain of BAMBI were significantly higher among parents with a low level of education than among those with a high level of education. The features of autism

domain was the only one that was significantly correlated with the education level of the parents ($p = 0.043$). This means that parents with a low level of education reported more problems during mealtime that were related to the features of autism.

Discussion

This study offers important information on the mealtime behaviours of children with ASD in KSA. Firstly, the findings revealed that children with ASD in KSA do not generally display excessive behaviour problems compared to children with ASD in previous studies. Additionally, the majority of the children in this sample had a limited variety of food during mealtime and displayed no aggressive or injurious behaviour, and around half of these children were flexible about mealtime routines. Secondly, this study found that there is no significant association between mealtime behaviour problems and general difficult behaviours in children with autism in KSA. Finally, this study showed that parents with a low level of education reported more problems during mealtime that were related to the features of autism than other parents. This is a new finding that has not emerged in any previous research.

Consistent with the findings of the present study, one of the most documented mealtime behaviour problems in children with ASD is the limited variety of food (Bandini et al., 2010; Castro et al., 2016; Nadon et al., 2011; Vissoker et al., 2015). Accordingly, Dfy et al. (2016) also reported that limited variety of food was the most dominant mealtime problem in their sample and that almost half of the caregivers found that this behaviour in their children with ASD was problematic (Dfy et al., 2016). Parents of children with ASD in this study also found it problematic that their children preferred crunchy food and to have food served in a particular way. Similarly, Al-Kindi et al. (2016) also argue that children with ASD are more selective eaters than TDC. Their study found that children with ASD preferred having only a limited variety of food; for example, they were unwilling to try new foods or expressed dislike for certain foods (Al-Kindi et al., 2016). Their findings are also consistent with the

findings from this study about behaviours related to food selectivity and limited food variety. In addition, the present results revealed that the majority of children with ASD in KSA do not prefer sweet foods, as also reported previously by Gray and Chiang (2017). The reason for selective eating behaviours among children with ASD could be related to the nature of autism and rigid adherence to rituals and routines, as this is one of the core features of ASD. As an alternative explanation, sensory dysfunction in children with ASD may play a role in problematic mealtime behaviours. Zobel-Lachiusa et al. (2015) found that mealtime behaviour problems were related to sensory difficulties in children with ASD, such as enhanced or reduced sensitivity to the textures, smell, or taste of food. However, this relationship between sensory processing and mealtime behaviour problems requires further investigation in the future.

The results of this study indicated that only less than a quarter of children with ASD prefer the same food at each meal, and this is consistent with the findings of Bandini et al. (2010), who also did not observe preference for the same food at every meal in their sample.

Most previous literature contradicts the finding in this study that children with ASD did not display aggressive or self-injurious behaviour, as previous studies found that children with ASD, compared to TDC, were very aggressive during mealtimes, had difficulty remaining seated, and had more problematic eating behaviour such as crying, turning away from food and expelling already chewed food (Al-Kindi et al., 2016; Castro et al., 2016). However, Al-Kindi et al. (2016) found that self-injuries were rarely displayed during mealtime, as reported in the present study. Another study by Gray and Chiang (2017) also showed that the majority of Chinese-American children with ASD do not display aggressive or disturbing mealtime behaviours. Moreover, the results of this study showed that problems in flexibility, such as remaining seated during mealtimes, was displayed by the majority of the children with ASD, as also discussed by Attlee et al. (2015). This could be related to the nature of the disorder, as children with ASD might use this behaviour to communicate their needs.

The majority of the parents in this study indicated that they found it problematic when their children expel food, prefer crunchy food, and prefer food served in a particular way. This was also previously reported: for example, Chan's study shows that 30–50% of parents were very stressed by their children's mealtime behaviour problems. Additionally, the parents of children with ASD in the Al-Kindi et al. (2016) study also revealed similar feelings of being distressed over their children's problem behaviours during mealtimes.

One of the main findings of this study was that mealtime behaviour problems were not found to be correlated with behaviour problems in children with ASD. This is probably because behaviours displayed during mealtime are considered to be different from general behaviours displayed in other situations, but more research is needed to investigate the reasons for such an outcome. What was found in the literature was only related to ASD symptoms severity, as some studies reported that the mealtime behaviour problems in children with ASD were not correlated with the severity of the disorder (Aponte & Romanczyk, 2016; Schreck et al., 2004). However, it is not wise to equate behaviour problems with symptom severity in children with ASD, as the two represents different aspects of the condition.

Limitations

The study has some limitations. First, as indirect data are used, it is impossible to determine whether the information the parents provided accurately reflected the behaviours that the children actually display during mealtimes. In future research, an additional method of data collection, such as observation, should be used to validate the findings. Second, it is difficult to determine whether a child's refusal of a certain food was influenced by unwillingness to try the food or by parents who might have prevented their children from knowing this food by not offering it to them previously under the assumption that they might not like it. Third, many children with ASD suffer from gastrointestinal conditions and follow special diets. Therefore, their dietary restrictions might

have prevented them from trying certain types of food that they might also refuse to try in the future as a result of being habituated to eating only a limited variety of food. Finally, it should be noted that generalizability is a common issue in observational studies. More longitudinal studies are needed to explore whether mealtime behaviour problems in children with ASD continue over time. Additionally, as the participants of this study were from the western region of KSA, the findings may not represent parents of children with ASD across the other regions of KSA. However, this could not be an issue considering that people from different regions in the country have nearly similar mealtime behaviours themselves.

Conclusion

The findings of this study show that children with ASD in KSA display mild mealtime behaviour problems, but also provide evidence that feeding behavioural problems do exist in this population. Thus, understanding children's mealtime behaviours could be the first step to designing interventions to inform and educate children and their parents about healthier mealtime habits which could decrease parental distress. The findings of this study may also provide useful information for professionals who work with children with ASD in KSA and help them to identify the main mealtime behaviour problems in their clients.

Suggestions for Future Research

- Future studies should focus of the importance of screening for feeding behaviour problems in children with ASD during mealtimes in different settings.
- The relationship between sensory processing problems and mealtime behaviour problems needs further exploration.
- Longitudinal studies examining food selectivity and limited food variety in children with ASD are needed to explore whether these behaviours continue into adulthood.
- The effect of continued food selectivity on health and dietary status in children with ASD needs to be examined.

References

1. Ahearn, W. H., Castine, T., Nault, K., & Green, G. (2001, October). An assessment of food acceptance in children with autism or pervasive developmental disorder-not otherwise specified. *Journal of Autism and Developmental Disorders*, 31(5), 505–511. <https://doi.org/10.1023/a:1012221026124>
2. Al-Farsi, Y. M., Waly, M. I., Al-Sharbati, M. M., Al-Shafae, M. A., Al-Farsi, O. A., Al-Khaduri, M. M., Gupta, I., Ouhtit, A., Al-Adawi, S., Al-Said, M. F., & Deth, R. C. (2013, February 1). Levels of Heavy Metals and Essential Minerals in Hair Samples of Children with Autism in Oman: a Case–Control Study. *Biological Trace Element Research*, 151(2), 181–186. <https://doi.org/10.1007/s12011-012-9553-z>
3. Al-Kindi, N., Al-Farsi, Y., Waly, M., Al-Shafae, M., Bakheit, C., Al-Sharbati, M., & Al-Adawi, S. (2016, June 30). Comparative Assessment of Eating Behavior among Children with Autism to Typically Developing Children in Oman. *Canadian Journal of Clinical Nutrition*, 4, 51–64. <https://doi.org/10.14206/canad.j.clin.nutr.2016.02.05>
4. Almaqrami, M. H., & Shuwail, A. Y. (2004, May). Validity of the self-report version of the strengths and difficulties questionnaire in Yemen. *Saudi Medical Journal*, 25(5), 592–601.
5. Alyahri, A., & Goodman, R. (2006). Validation of the Arabic Strengths and Difficulties Questionnaire and the Development and Well-Being Assessment. *East Mediterranean Health Journal*, 12(2), S138–146.
6. Aponte, C. A., & Romanczyk, R. G. (2016, January 1). Assessment of feeding problems in children with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 21, 61–72. <https://doi.org/https://doi.org/10.1016/j.rasd.2015.09.007>

7. Attlee, A., Kassem, H., Hashim, M., & Obaid, R. S. (2015, August). Physical Status and Feeding Behavior of Children with Autism. *The Indian Journal of Pediatrics*, 82(8), 682–687. <https://doi.org/10.1007/s12098-015-1696-4>
8. Bandini, L. G., Anderson, S. E., Curtin, C., Cermak, S., Evans, E. W., Scampini, R., Maslin, M., & Must, A. (2010). Food Selectivity in Children with Autism Spectrum Disorders and Typically Developing Children. *The Journal of Pediatrics*, 157(2), 259–264. <https://doi.org/10.1016/j.jpeds.2010.02.013>
9. Blaurock-Busch, E., Amin, O. R., & Rabah, T. (2011). Heavy metals and trace elements in hair and urine of a sample of arab children with autistic spectrum disorder. *Maedica (Bucharest)*, 6(4), 247–257. <https://pubmed.ncbi.nlm.nih.gov/22879836>
10. Castro, K., Faccioli, L. S., Baronio, D., Gottfried, C., Perry, I. S., & Riesgo, R. (2016). Feeding behavior and dietary intake of male children and adolescents with autism spectrum disorder: A case-control study. *International Journal of Developmental Neuroscience*, 53(1), 68–74. <https://doi.org/10.1016/j.ijdevneu.2016.07.003>
11. Cornish, E. (1998). A balanced approach towards healthy eating in autism. *Journal of Human Nutrition and Dietetics*, 11(6), 501–509. <https://doi.org/10.1046/j.1365-277X.1998.00132.x>
12. Dfy, C., Ccw, Y., Hk, S., Chan, S., & Tsang, N. (2016, January 1). Mealtime Behavioral Problems in Hong Kong Chinese Preschoolers with Autism Spectrum Disorder. *Journal of Psychological Abnormalities*, 5. <https://doi.org/10.4172/2471-9900.S1-004>
13. Evans, E. W., Must, A., Anderson, S. E., Curtin, C., Scampini, R., Maslin, M., & Bandini, L. (2012, January 1). Dietary patterns and body mass index in children with autism and typically developing children. *Research in Autism Spectrum Disorders*, 6(1), 399–405. <https://doi.org/https://doi.org/10.1016/j.rasd.2011.06.014>

14. Geraghty, M. E., Bates-Wall, J., Ratliff-Schaub, K., & Lane, A. E. (2010). Nutritional Interventions and Therapies in Autism: A Spectrum of What We Know: Part 2. *ICAN: Infant, Child, and Adolescent Nutrition*, 2(2), 120–133. <https://doi.org/10.1177/1941406410366848>
15. Goodman, R. (1997, July). The Strengths and Difficulties Questionnaire: a research note. *The Journal of Child Psychology and Psychiatry*, 38(5), 581–586.
16. Goodman, R. (2001a, November). Psychometric properties of the strengths and difficulties questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40(11), 1337–1345. <https://doi.org/10.1097/00004583-200111000-00015>
17. Goodman, R. (2001b, November). Psychometric properties of the strengths and difficulties questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40(11), 1337–1345. <https://doi.org/10.1097/00004583-200111000-00015>
18. Gray, H. L., & Chiang, H.-M. (2017, March 1). Brief Report: Mealtime Behaviors of Chinese American Children with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*, 47(3), 892–897. <https://doi.org/10.1007/s10803-016-2993-0>
19. Greer, A. J., Gulotta, C. S., Masler, E. A., & Laud, R. B. (2007). Caregiver Stress and Outcomes of Children with Pediatric Feeding Disorders Treated in an Intensive Interdisciplinary Program. *Journal of Pediatric Psychology*, 33(6), 612–620. <https://doi.org/10.1093/jpepsy/jsm116>
20. Johnson, C. R., Handen, B. L., Mayer-Costa, M., & Sacco, K. (2008, October 1). Eating Habits and Dietary Status in Young Children with Autism. *Journal of Developmental and Physical Disabilities*, 20(5), 437–448. <https://doi.org/10.1007/s10882-008-9111-y>

21. Koskelainen, M., Sourander, A., & Vauras, M. (2001, September). Self-reported strengths and difficulties in a community sample of Finnish adolescents. *European Child and Adolescent Psychiatry, 10*(3), 180–185.
22. Lecavalier, L., Leone, S., & Wiltz, J. (2006). The impact of behaviour problems on caregiver stress in young people with autism spectrum disorders. *Journal of Intellectual Disability Research, 50*(3), 172–183. <https://doi.org/10.1111/j.1365-2788.2005.00732.x>
23. Ledford, J. R., & Gast, D. L. (2006). Feeding Problems in Children With Autism Spectrum Disorders: A Review. *Focus on Autism and Other Developmental Disabilities, 21*(3), 153–166. <https://doi.org/10.1177/10883576060210030401>
24. Lukens, C. T., & Linscheid, T. R. (2008, February). Development and validation of an inventory to assess mealtime behavior problems in children with autism. *Journal of Autism and Developmental Disorders, 38*(2), 342–352. <https://doi.org/10.1007/s10803-007-0401-5>
25. Muris, P., Meesters, C., & van den Berg, F. (2003, February 1). The Strengths and Difficulties Questionnaire (SDQ). *European Child and Adolescent Psychiatry, 12*(1), 1–8. <https://doi.org/10.1007/s00787-003-0298-2>
26. Nadon, G., Feldman, D. E., Dunn, W., & Gisel, E. (2011). Association of sensory processing and eating problems in children with autism spectrum disorders. *Autism Research and Treatment, 2011*, 541926. <https://doi.org/10.1155/2011/541926>
27. Oommen, A., & AlOmar, R. S. (2020). Role of nutritional deficiency in the development of autism spectrum disorders. *International Journal of Research in Medical Sciences, 8*(5), 1968–1972.

28. Raiten, D. J., & Massaro, T. (1986, June 1). Perspectives on the nutritional ecology of autistic children. *Journal of Autism and Developmental Disorders*, 16(2), 133–143. <https://doi.org/10.1007/BF01531725>
29. Ronning, J. A., Handegaard, B. H., Sourander, A., & Mørch, W. T. (2004, April). The Strengths and Difficulties Self-Report Questionnaire as a screening instrument in Norwegian community samples. *European Child and Adolescent Psychiatry*, 13(2), 73–82. <https://doi.org/10.1007/s00787-004-0356-4>
30. Schreck, K. A., & Williams, K. (2006, July 1). Food preferences and factors influencing food selectivity for children with autism spectrum disorders. *Research in Developmental Disabilities*, 27(4), 353–363. <https://doi.org/https://doi.org/10.1016/j.ridd.2005.03.005>
31. Schreck, K. A., Williams, K., & Smith, A. F. (2004, August 1). A Comparison of Eating Behaviors Between Children with and Without Autism. *Journal of Autism and Developmental Disorders*, 34(4), 433–438. <https://doi.org/10.1023/B:JADD.0000037419.78531.86>
32. Sharp, W. G., Berry, R. C., McCracken, C., Nuhu, N. N., Marvel, E., Saulnier, C. A., Klin, A., Jones, W., & Jaquess, D. L. (2013, September 1). Feeding Problems and Nutrient Intake in Children with Autism Spectrum Disorders: A Meta-analysis and Comprehensive Review of the Literature. *Journal of Autism and Developmental Disorders*, 43(9), 2159–2173. <https://doi.org/10.1007/s10803-013-1771-5>
33. Shmaya, Y., Eilat-Adar, S., Leitner, Y., Reif, S., & Gabis, L. (2015, March 1). Nutritional deficiencies and overweight prevalence among children with autism spectrum disorder. *Research in Developmental Disabilities*, 38, 1–6. <https://doi.org/https://doi.org/10.1016/j.ridd.2014.11.020>

34. Smedje, H., Broman, J. E., Hetta, J., & von Knorring, A. L. (1999, June). Psychometric properties of a Swedish version of the "Strengths and Difficulties Questionnaire". *European Child and Adolescent Psychiatry, 8*(2), 63–70.
35. Vissoker, R. E., Latzer, Y., & Gal, E. (2015, April 1). Eating and feeding problems and gastrointestinal dysfunction in Autism Spectrum Disorders. *Research in Autism Spectrum Disorders, 12*, 10–21.
<https://doi.org/https://doi.org/10.1016/j.rasd.2014.12.010>
36. Viviers, M. (2018, August 9). Parent-reported feeding and swallowing difficulties of children with Autism Spectrum Disorders (aged 3 to 5 years) compared to typically developing peers: A South African study. *African Health Sciences, 20*(1).
37. Whiteley, P., Rodgers, J., & Shattock, P. (2000, June 1). Feeding Patterns in Autism. *Autism, 4*(2), 207–211.
<https://doi.org/10.1177/1362361300004002008>
38. Williams, P. G., Dalrymple, N., & Neal, J. (2000). Eating habits of children with autism. *Pediatric Nursing, 26*(3), 259.
39. Zimmer, M. H., Hart, L. C., Manning-Courtney, P., Murray, D. S., Bing, N. M., & Summer, S. (2012, April 1). Food Variety as a Predictor of Nutritional Status Among Children with Autism. *Journal of Autism and Developmental Disorders, 42*(4), 549–556.
<https://doi.org/10.1007/s10803-011-1268-z>
40. Zobel-Lachusua, J., Andrianopoulos, M. V., Mailloux, Z., & Cermak, S. A. (2015). Sensory Differences and Mealtime Behavior in Children with Autism. *American Journal of Occupational Therapy, 69*(5), 6905185050p6905185051–6905185050p6905185058.
<https://doi.org/10.5014/ajot.2015.016790>