Journal of Psychological Abnormalities

Chan et al., J Psychol Abnorm 2016, S1
DOI: 10.4172/jpab.S1-004

Research Article Open Access

# Mealtime Behavioral Problems in Hong Kong Chinese Preschoolers with Autism Spectrum Disorder

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## Abstract

The relationship between Autism Spectrum Disorder (ASD) and mealtime behavioural problems has been discussed in the United States recently, but there is limited research data on this matter in Chinese children. This study aims to evaluate the prevalence of feeding and mealtime behavioural problems in Hong Kong Chinese preschoolers with ASD using the Brief Autism Mealtime Behavior Inventory (BAMBI). Parents with children aged between 2 to 6 years old diagnosed with ASD were asked to complete a Chinese version of BAMBI, which is a validated 18-item questionnaire designed to measure mealtime behavioural problems in children with ASD. A total of 177 children were enrolled: 78.0% were boys and 22.0% were girls; the mean age was 5.0 (2.9-6.3). The survey revealed that the "limited variety" of food was the most prevalent feeding problem. Close to half of caregivers found limited food variety being problematic and affecting their daily functioning. The perception of problems by caregivers was positively correlated with the frequency of problematic feeding behaviours. These feeding behavioural problems are not alleviated by current training. We suggest concentrating specifically on addressing the feeding behaviour through a multidisciplinary approach and by incorporating dietary advice, which will be beneficial to children with ASD and their families.

**Keywords:** Autism spectrum disorder; Mealtime behaviour; Feeding behavior; Dietary advice

## Introduction

Autism Spectrum Disorder (ASD) is characterized by a significant impairment in social interaction and communication, a wide range of rigid behaviours and sensory disintegration. These symptoms make ASD one of the most devastating neurodevelopmental disorders, causing major dysfunction in the individual's daily living and having a negative impact on the families of affected children [1-3].

According to the latest update by the Centers for Disease Control and Prevention (CDC) in the US, about 1 in 68 children suffers from ASD, the rising trend of prevalence has also been reported worldwide [4]. However, in Hong Kong (HK) there is a lack of well-designed population-based prevalence and epidemiological study on ASD. Here, over 90% of children aged less than 2 years old attend Maternity and Child Health Centers (MCHCs) to receive vaccinations and developmental surveillance (DSS). Children are referred to the tertiary Child Assessment Center (CAC) for further evaluation of suspected developmental problems. Children with ASD are diagnosed by the paediatrician or clinical psychologist according to the standards of Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM IV). An annual report by the Child Assessment Services (CAS) from the Department of Health revealed that there was an increase of 184% in ASD diagnosis from the years 1997 to 2005 [5]. Though CAS captured a great proportion of children diagnosed with ASD, their data remains an underestimate of the true prevalence in Hong Kong. This is due to quite a number of children nowadays being diagnosed in the private sector, and there are certainly children attending mainstream schools without a diagnostic label being given.

Preschool aged children who are diagnosed to have ASD are placed in rehabilitation services according to the degree of severity, where attention is focused mainly on behavioural, speech and physical management. No regular medical follow-up is given if no definitive cause is identified for this group of children. Once they are allocated a place for training, little contact will be made with paediatricians, psychiatrists or general practitioners. Hence, medical child health issues are overlooked. Our group looked into the health issues of this group of children and published a report on the dental health problems in children with ASD in Hong Kong [6]. The study found that the occurrence of dental caries was significantly higher in children of mothers with a low educational level and in children from low-income families.

Feeding is another mandatory health area affecting early childhood health and behavioural development for survival. Atypical eating behaviours and problems have become a growing concern among parents of children with ASD [1,7-9], Ledford and Gast reviewed 381 children with ASD from seven studies: all studies showed that food selectivity was the most significant feeding problem [8]. The wide variety of methodologies in these studies explains the wide-ranging prevalence rate of feeding difficulties from 46% to 89%. Typical feeding development was greatly affected by such eating behavioural difficulties.

Nutritional concerns about restrictive feeding behaviour were underinvestigated. Conflicting results were reported due to the lack of comparison groups and inconsistent dietary records. The latest meta-analysis by W.G. Sharp et al. reviewed 17 eligible studies, analyzing comparison groups of children with ASD and found that the subjects had significantly less intake of calcium and protein [9].

The feeding behavioural problems of children with Autism Spectrum Disorder appear to be relatively common in Hong Kong, though no reliable statistics are available. Thus, the present study aims to examine the prevalence of feeding problems in preschool children with ASD in HK and to arouse public and medical awareness of the health issues of this specific group of children.

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**Received** January 29, 2016; **Accepted** February 19, 2016; **Published** February 26, 2016

**Citation:** Chan DFY, Yu CCW, So HK, Sharon Chan, Tsang N (2016) Mealtime Behavioral Problems in Hong Kong Chinese Preschoolers with Autism Spectrum Disorder. J Psychol Abnorm S1: 004. doi:10.4172/jpab.S1-004

## Materials and Methods

### Participants

All children aged 2 to 6 years diagnosed with confirmed or suspected Autism, Autistic features, Autism Spectrum Disorder, Asperger Syndrome, Pervasive Developmental Disorder by developmental paediatricians or clinical psychologists from public or private sectors based on the DSM-IV, were invited from 13 rehabilitation-training centres (Early Training Centers and Special Child Care Centers) of Heep Hong Society in the year of 2012-2013. Heep Hong Society is one of the rehabilitation organizations in Hong Kong. It operates 13 Special Child Care Centers (SCCC) for preschool children, and makes up one third of all SCCCs in Hong Kong. Written consent was obtained from parents. Basic demographic data was collected.

### The brief autism mealtime inventory (BAMBI) - Chinese version

The Brief Autism Mealtime Inventory (BAMBI) is the standardized measure developed for mealtime behaviour specific to the ASD population. It consists of 18 items, and is a parent self-report questionnaire. A frequency score can be calculated using the total score of the 18 Likert responses. Higher scores represent more problematic mealtime behaviour. The BAMBI has three domains: 'Limited Variety', 'Food Refusal' and 'Features of Autism'. The 'Limited Variety' domain consists of eight items related to limited food preferences, 'Food Refusal' has five items related to rejection of food, and the 'Features of Autism' has five items related to behavioural characteristics or associated features of Autism. It indicates how often their child engages in a particular eating behaviour with response options ranging from 1 for 'never' to 5 for 'always' with a neutral midpoint. The internal consistency for the 18 items questionnaire of BAMBI was reported as high (Cronbach's coefficient alpha = 0.88), with good test-retest reliability (r = 0.87, $p < 0.01$) and inter-rater reliability (r = 0.78, $p < 0.01$) [10]. BAMBI has been translated and back translated into the Chinese version. A total frequency score was obtained. Caregivers indicated their perception of problems in daily living according to each symptom by answering "Yes" or "No" to each question.

### Statistical analysis

Descriptive data was presented as percentages for discrete variables and as the mean for continuous variables. Trends were identified using cross-tabulation to assess the linear-by-linear relationships among different ethnic groups of parents who reported problem eating behaviours. All statistical analyses were performed using PASW statistics 21.0 (SPSS Inc., Chicago, IL, USA). All statistical tests were two-sided and a *P*-value 0.05 was considered statistically significant.

### Ethics

The present study was conducted according to the guidelines laid down in the Declaration of Helsinki, and all procedures involving human subjects/patients were approved by the Joint Chinese University of Hong Kong and New Territories East Cluster Clinical Research Ethics Committee.

## Results

A total of 194 questionnaires were collected from 13 Heep Hong centers, 177 of them were valid with less than 4 unanswered items. All children recruited were Hong Kong Chinese, of which 78.0% were boys and 22.0% were girls with the mean age of 5.0 (2.9-6.3) (Table 1). The distribution of the family income, paternal and maternal education level were all comparative to the Hong Kong general population as reported by the Hong Kong Statistics Department [11].

| Characteristics | |
|---|---|
| Number of subjects | 177 |
| Boys | 78.0% |
| Age (mean ± SD) | 5.0 (0.8) |
| *BAMBI (raw score)* | |
| Food refusal | 8.1 (2.9) |
| Features of autism | 9.7 (2.6) |
| Limited variety | 19.9 (4.9) |
| *Family monthly income* | |
| Comprehensive Social Security Assistance | 3.6% |
| < HKD15000 | 22.5% |
| HKD15000-39999 | 41.4% |
| HKD40000 or above | 32.5% |
| *Paternal education level* | |
| Primary or below | 4.6% |
| Secondary | 57.1% |
| Territory or above | 38.3% |
| *Maternal education level* | |
| Primary or below | 6.9% |
| Secondary | 58.1% |
| Territory or above | 35.0% |
| *Paternal occupation* | |
| Unemployment or Housemen | 7.6% |
| Worker | 18.1% |
| Clerk | 10.5% |
| Professional | 32.2% |
| Others | 31.6% |
| *Maternal occupation* | |
| Unemployment or Housewife | 52.3% |
| Worker | 2.3% |
| Clerk | 17.0% |
| Professional | 18.2% |
| Others | 10.2% |

**Table 1:** Characteristics of the pre-schoolers with autism.

The survey results were compared with independent data from Japan and Indonesia. Among the 177 Hong Kong, 31 Japanese and 13 Indonesian parents reported eating problem behaviours of their Autistic children in terms of 'Limited Variety', 'Food Refusal' and 'Features of Autism' in similar proportion with no statistic difference demonstrated (Table 2) [12].

### BAMBI mean raw scores

The mean raw scores of the three feeding behaviour domains were: "Food Refusal" 8.1 (+/- 2.9); "Features of Autism" 9.7 (+/- 2.6); "Limited Variety" 19.9 (+/- 4.9). The highest mean raw score belonged to factor of "Limited Variety" of food. Frequent scores higher than 3 indicating "very frequent" or "always" were classified as significant.

**Symptoms of "limited variety of food":** In the Hong Kong study, there were a number of interesting findings. Thirty-nine percent of the children were reported as being unwilling to try new foods. 42.4% of children disliked certain foods and refused to eat them. A quarter of them did not accept variety of food. A quarter of the subjects preferred eating crunchy foods. Ten percent of children preferred to have food served or prepared in particular way and preferred only sweet foods.

| Questions | | | | |
|---|---|---|---|---|
| | HK (n = 177) | Japan (n = 31) | Indonesia (n = 13) | *P*-value |
| My child… | | | | |
| **Food Refusal** | | | | |
| 1. Cries or Scream during mealtimes | 30 (17.0) | 2 (6.5) | 1 (7.7) | 0.198 |
| 2. Turn his/her face or body away from food | 44 (24.9) | 7 (22.6) | 4 (30.8) | 0.820 |
| 4. Expels food that he/she has eaten | 39 (22.0) | 5 (16.1) | 1 (7.7) | 0.253 |
| 7. Is disruptive during mealtimes | 23 (13.0) | 2 (6.5) | 1 (7.7) | 0.410 |
| 8. Closes mouth tightly when food is presented | 31 (17.5) | 2 (6.5) | 3 (23.0) | 0.204 |
| **Features of Autism** | | | | |
| 3. Remains seated at the table until meal is finished | 60 (38.9) | 16 (51.6) | 6 (46.2) | 0.384 |
| 5. Is aggressive during mealtimes | 16 (9.0) | 5 (16.1) | 2 (15.4) | 0.486 |
| 6. Displays self-injurious behavior during mealtimes | 8 (4.5) | 1 (3.2) | 0 (0.0) | 0.685 |
| 9. Is flexible about mealtime routines | 43 (24.3) | 5 (16.1) | 4 (30.8) | 0.423 |
| 12. Refuses to eat foods that require a lot of chewing | 40 (22.6) | 7 (22.6) | 1 (7.7) | 0.393 |
| **Limited Variety** | | | | |
| 10. Is willing to try new foods | 69 (39.0) | 18 (58.1) | 3 (23.3) | 0.089 |
| 11. Dislike certain foods and won't eat them | 75 (42.4) | 18 (58.1) | 6 (46.2) | 0.562 |
| 13. Prefers the same food at each meal | 45 (25.4) | 9 (29.0) | 2 (15.4) | 0.608 |
| 14. Prefers "crunchy" foods | 44 (24.9) | 8 (25.8) | 4 (30.8) | 0.945 |
| 15. Accepts or prefers a variety of foods | 42 (23.7) | 10 (32.3) | 3 (23.1) | 0.770 |
| 16. Prefers to have food served in particular way | 16 (9.0) | 5 (16.1) | 0 (0.0) | 0.251 |
| 17. Prefers only sweet foods | 17 (9.6) | 3 (9.7) | 4 (30.8) | 0.092 |
| 18. Prefers food prepared in particular way | 20 (11.3) | 5 (16.1) | 3 (23.1) | 0.502 |

**Table 2:** Parents report of eating behaviors as problem.

Close to half (45.8%) of the caregivers found the symptoms of "limited food variety" problematic to their daily functioning.

**Symptoms related to features of autism:** There were 38.9% of children reported to have problems remaining seated for the completion of eating a meal. A quarter of them were not flexible about mealtime routines. Twenty percent of them refused food that required a lot of effort in chewing. Ten percent of them were aggressive during mealtimes and 5% of them would display self-injurious behaviour during mealtimes. A quarter to 30% of caregivers found that these symptoms were problematic to their daily living.

**"Food refusal":** A quarter of the subjects were reported as turning away from food and 22% would spill out food that they had eaten. Thirteen percent to 17.5% of them would close their mouths tightly when food was presented, cry or scream and were disruptive during mealtimes.

The BAMBI score was significantly and positively correlated with the number of feeding behaviours that caregivers found problematic, i.e., perception of problems were correlated with the frequency of eating behaviours ($p < 0.001$). As reported, 34% of our subjects required at least 2 caregivers for supervision during the mealtime period. The severity of feeding behaviour was not correlated to family income, paternal or maternal educational level. The duration of training in Heep Hong centers also did not correlate to the BAMBI frequency score and the perception of problems by their caregivers.

## Discussion

As expected, Hong Kong Chinese preschoolers with Autism had poor food variety scores. Some of them appeared to be flexible in their food choices, while others were much more limited and seemed to restrict their intake. Our findings are also consistent with previously published reports on problematic eating behaviours: there is a high prevalence of limited variety of food behaviour such as unwillingness to try new food, a dislike of certain food and refusing to eat them [7,12-15].

Our findings were confirmed by BAMBI that Japanese, Indonesian and Hong Kong Chinese preschoolers had similar eating behaviour problems [12]. The prevalence of mealtime behavioural problems reported in Japanese and Indonesian preschool children with ASD was similar to our findings in Hong Kong regardless of their ethnic origin: the insistence on food being prepared in a certain way; difficulty remaining seated until the meal was finished; and inflexible mealtime routines.

Difficulties with social interactions are also characteristic of Autistic children. Lack of age-appropriate social exchanges and opportunities to observe role models on appropriate mealtime behavior may make it difficult for a child with Autism to learn the socially appropriate use of utensils and self-feeding skills [9]. The combination of these factors and communication deficits may make it difficult for a child to maintain a nutritionally adequate diet. Although profound growth retardation are not reported, diet quality and nutrient intake may be affected by this kind of disordered eating behaviours [16]. In addition, their rigidity and repetitive behaviour leading to food restrictions might contribute to long term nutritional consequences. A recent American study reported the frequency of selective eating and nutritional deficiency among 22 children with Autism with mean age of 8 and among an age-matched typically developing control group [17]. Children with Autism ate fewer food varieties on average than typically developing children (33.5 *vs.* 54.5 foods, $p < 0.001$). It suggested that selective eaters with Autism are at greater risk of inadequate nutritional intake, the findings of the majority of these studies are consistent with nutrient intake compared to non-selective eaters with Autism and a control group. Conclusions drawn from these descriptive reports of limited nutrition and high levels of behavioral feeding problems in children with Autism–were limited by the variety of methodology and limited sample size.

Children with Autism demonstrate a wide range of more problematic eating behaviours than the general population [10,18]. The reason for selective eating habits among children with Autism

has not been thoroughly investigated, but rigid adherence to rituals and routines seen as a core feature of autism is one hypothesized explanation. Sensory integration dysfunction may also play a role in problematic eating behaviours. Bennetto et al. found that children with ASD have problems correctly identifying taste and olfactory sensations suggesting that over or under responsiveness to sensory stimuli may also contribute to the high prevalence of feeding difficulties among this population [19]. This is an area that requires further investigation.

In our study, nearly 30-50% of parents were very stressed by the feeding mealtime behaviour. Every day, the preschool children would have 3 main meals and 2 snack times, carers or parents needed to encounter daily cumulative stress on their aggressive mealtime behaviour including screaming, crying and disruptive behaviours. Moreover, 34% of the children need at least two caregivers at each meal which indicates the mandatory need for intervention to this specific targeted feeding problem in order to save the psychological integrity of both the child and the one who cares them. These kinds of behaviours are not related to training duration or family background. Hence, children with ASD should be screened or evaluated for feeding mealtime behaviour and should be specifically referred to a multidisciplinary feeding program which should be under the supervision of physicians, nutritionists, psychologists, occupational therapists and speech therapists.

## Study Limitations

There are several limitations to this descriptive study. Although all recruited subjects were suffering from Autism Spectrum Disorder, they were all attending special child care centers which only provided rehabilitation services to children with a moderate to severe degree of the disorder. The relationship of eating mealtime behaviour might not be fully reflected for children with milder ASD. Furthermore, in terms of the overall reliability of BAMBI, some parents failed to complete all the questions; 91% of the questionnaires were valid with less than 4 unanswered items. The generalization of these results may be questionable. In addition, the children in this study were all referred from one single non-government organization within one single year, so it is unclear how this sample reflects the larger population of children with feeding problems. Further larger scale study recruiting all children with different degrees of ASD severity would be worth conducting.

## Conclusion

BAMBI (Chinese Version) can be used on the Chinese population to assess the feeding and mealtime behaviour of children with ASD. Limited variety of food is the most frequent presentation of feeding problems in Hong Kong preschool children with ASD and causes a lot of stress to the caregivers. These feeding behavioural problems are not improved by current training. We recommend concentrating specifically on addressing the feeding behaviour though a multidisciplinary approach and by incorporating dietary advice, which will be beneficial to children with ASD and their families.

### Acknowledgement

We would like to thank all the children, parents and professionals who participated in this study.

### References

1. Lukens CT, Linscheid TR (2008) Development and validation of an inventory to assess mealtime behavior problems in children with autism. J Autism Dev Disord 38: 342-352.
2. Nadon G, Feldman DE, Dunn W, Gisel E (2011) Mealtime problems in children with autism spectrum disorder and their typically developing siblings: a comparison study. Autism 15: 98-113.
3. Volkert VM, Vaz PC (2010) Recent studies on feeding problems in children with autism. J Appl Behav Anal 43: 155-159.
4. Developmental Disabilities Monitoring Network Surveillance Year 2010 Principal Investigators; Centers for Disease Control and Prevention (CDC) (2014) Prevalence of autism spectrum disorder among children aged 8 years - autism and developmental disabilities monitoring network, 11 sites, United States, 2010. MMWR Surveill Summ 63: 1-21.
5. Woo EKF, Lam LL (2007) CAS Epidemiological Data on Autistic Spectrum Disorder from 2003- 2005. CASER 3: 1-8.
6. Chan DFY, Chan SHY, So HK, Li AM, Ng RCM, et al. (2014) Dental Health of Preschool Children with Autism Spectrum Disorder in Hong Kong. HK J Paediatr (New Series) 19: 161-168.
7. Bandini LG, Anderson SE, Curtin C, Cermak S, Evans EW, et al. (2010) Food selectivity in children with autism spectrum disorders and typically developing children. J Pediatr 157: 259-264.
8. Ledford JR, Gast DL (2006) Feeding Problems in Children With Autism Spectrum Disorders. Focus on Autism and other Developmental Disabilities 21: 153-166.
9. Sharp WG, Berry RC, McCracken C, Nuhu NN, Marvel E, et al. (2013) Feeding problems and nutrient intake in children with autism spectrum disorders: a meta-analysis and comprehensive review of the literature. J Autism Dev Disord 43: 2159-2173.
10. Schreck KA, Williams K, Smith AF (2004) A comparison of eating behaviors between children with and without autism. J Autism Dev Disord 34: 433-438.
11. Census and Statistics Department (2015) Hong Kong: The Facts. Hong Kong, Information Services Department, Hong Kong Special Administrative Region Government.
12. Handayani M, Herini ES, Takada S (2012) Eating Behavior of Autistic Children. Nurse Media J Nurs 2: 281-294.
13. Emond A, Emmett P, Steer C, Golding J (2010) Feeding symptoms, dietary patterns, and growth in young children with autism spectrum disorders. Pediatrics 126: e337-e342.
14. Martins Y, Young RL, Robson DC (2008) Feeding and eating behaviors in children with autism and typically developing children. J Autism Dev Disord 38: 1878-1887.
15. Williams PG, Dalrymple N, Neal J (2000) Eating habits of children with autism. Pediatr Nurs 26: 259-264.
16. Ahearn WH, Castine T, Nault K, Green G (2001) An assessment of food acceptance in children with autism or pervasive developmental disorder-not otherwise specified. J Autism Dev Disord 31: 505-511.
17. Zimmer MH, Hart LC, Manning-Courtney P, Murray DS, Bing NM, et al. (2012) Food variety as a predictor of nutritional status among children with autism. J Autism Dev Disord 42: 549-556.
18. Schreck KA, Williams K (2006) Food preferences and factors influencing food selectivity for children with autism spectrum disorders. Res Dev Disabil 27: 353-363.
19. Bennetto L, Kuschner ES, Hyman SL (2007) Olfaction and taste processing in autism. Biol Psychiatry 62: 1015-1021.

This article was originally published in a special issue, **Children Psychology** handled by Editor(s). Dr. Gérard Mercier, University of Besancon, France