

Food Selectivity in Obese Adolescents with Autism Spectrum Disorder

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Abstract

Background: Food selectivity has been documented in children and is more prevalent in children with autism spectrum disorder (ASD). This can create feeding difficulties that may present as restricted food intake, texture based food selectivity, food refusal, and/or repetitive food choices.

Objective: To describe food selectivity in obese adolescent with ASD and suggests directions for future research.

Methods: Previous research assessed the effects of video game playing on obese adolescents with ASD utilizing a single subject multiple baseline design. Over 12 weeks, the participant played inactive (6 weeks) and active video games (6 weeks) on the Wii console. Physiological data (weight, height, waist-to-hip ratio, tricep skinfold) were evaluated weekly at home. Participants logged food intake each week during all phases (baseline, inactive video gaming, and active video gaming). Foods were grouped into the following categories: fruits, vegetables, proteins, starches, juices and other sweetened non-dairy drinks, and dairy.

Results: Similar to previous research, participants preferred starches to other categories of food (50-75% of food intake). Proteins were the second most chosen food group. Fruits and vegetables comprised less than 5% of the participants' diet.

Conclusions: Although numerous studies have examined food selectivity, none have assessed it in adolescents exclusively. This study describes food selectivity in obese adolescents and provides direction for future research.

Keywords: Food selectivity; Obese adolescents; Autism spectrum disorder

Food Selectivity in Obese Adolescents with Autism Spectrum Disorder

Food selectivity is a common parental concern in childhood that can become problematic and lead to issues such as nutritional deficits that may impair growth and development. Food selectivity has been reported to be more common in children with disabilities, specifically those with Autism Spectrum Disorder (ASD), 75.89% [1-5]. Food selectivity has been defined as the "refusal to eat developmentally appropriate food" and characterized as "eating a small range of food lacking in nutrition" [6]. This selectivity can create feeding difficulties. Indeed, children with ASD often have feeding difficulties that may present as restricted food intake, texture based food selectivity, food refusal, and/or repetitive food choices [2,3]. Although there is documented increased incidence of food selectivity among the ASD population, there is no clear indication of cause; yet, some researchers have hypothesized several relationships that may contribute to the food selectivity such as sensory impairments [7], family food preferences [4], and gastrointestinal system issues [8].

ASD presents unique challenges for researchers and clinicians to simultaneously address healthy lifestyles (i.e. food selectivity) and problematic features of ASD such as deficits in communication, socialization, and repetitive or stereotyped patterns of behavior [9].

Several studies have reported that food selectivity may contribute to obesity in children with ASD [10]. Obesity is estimated to have a prevalence rate of 30% in children with ASD compared to 24% of their typically developing peers [11,12]. Even more alarming, obesity continues into adulthood for those with ASD at a rate of 42% [13] which can contribute to serious health problems such as depression, diabetes mellitus, sleep apnea, and cardiovascular disease as well as social problems such as isolation, stigma, discrimination, and low self-esteem [11,12]. Furthermore, the economic costs of obesity have been estimated to be nearly 10% of total medical expenditures resulting in increased lifetime costs [13]. Rates of obesity are increasing at younger ages producing health complications earlier and may require interventions at younger ages [13].

Food selectivity has been known to be present in the younger years of children and was thought to subside with age [3]; however, children with ASD do not follow the same trend as those typically developing. Two longitudinal studies have shown that children with ASD have continued with similar food selectivity years later and in one case, decreased food repertoire [3,4]. Previous research has focused on children with ASD and food selectivity with mean ages ranging from four to eight years [1-4,7,10,13] with few addressing adolescents exclusively. Clearly, there exists a need to investigate food selectivity in adolescents with ASD. Thus, the purpose of this paper is to describe food selectivity in obese adolescents with ASD and discuss suggestions for future research regarding food selectivity and adolescents with ASD. This descriptive study was part of previous research assessing the

effects of video game playing on obese adolescents with ASD utilizing a single subject multiple baseline design [14].

Method

Participants were obese adolescents with ASD between the ages of 12.0 and 17.9 years. Participants were recruited from the community by flyers and referrals from a community autism center and local pediatricians. Participants were excluded if they had a physical disability or sensory disorder that would prevent video game playing or a history of epilepsy. Inclusion was based on a diagnosis of ASD, an age of 12.0-17.9 years, and overweight/obese as classified by the Centers for Disease Control and Prevention (CDC) [15]. A total of four participants met criteria and were enrolled. These four participants were Caucasian male adolescents with mild to moderate ASD, and were 12, 15, 16, and 17 years of age. Participants' BMI classified all of them as overweight or obese, 28.7-39.8, as defined by the CDC, and diagnosed with Attention Deficit/Hyperactivity Disorder (ADHD). The study protocol was approved by the University of Florida's Institutional Review Board. Written informed consent was obtained by the parent and assent of the adolescent. All four adolescents completed the 14-16 week protocol.

Participants' physiological data (weight, height, waist circumference, tricep skinfold) were collected weekly. The adolescents were weighed in light clothing without shoes using a digital scale. BMI was calculated from measures of height and weight (kg/m^2) and referenced against the sex and age specific CDC childhood growth chart [15]. Parents completed a demographic/medical questionnaire and were instructed to keep a food log that was provided and collected by the researcher each week. The adolescents were also instructed on how to keep the food log and were responsible for tracking food eaten during school. Any uncertainties were clarified at the weekly appointments for data collection with the parent and/or adolescent.

Foods were grouped into the following categories: fruits, vegetables, proteins, starches, juices and other sweetened non-dairy drinks, and dairy. All participants completed a food log for each week.

Results

Few characteristics differed among the adolescents and families. All four participants were Caucasian males diagnosed with mild to moderate ASD. Parents considered themselves middle class and all had a minimum of high school diploma with three of the mothers completing two years of college. All four adolescents had one sibling and both parents were involved with the children. The adolescents were all in public school. Two of the participants had one class of physical education (Participants 3 and 4) while one participant took martial arts as an extracurricular activity (Participant 2).

All adolescents preferred starches over other food categories. In fact, starches comprised over 50% of food choices in all participants and up to nearly three quarters of two participants' diets (Table 1). Proteins were the second highest food category logged during the study consisting of one quarter to one third of these adolescents' diets. The dairy category ranged from 2% to 8% for diet and consisted of cheeses, milk, ice cream, and pudding. Fruits were minimally consumed with the range of less than 1% to almost 4%, and one participant did not eat any fruit during the entire study. The fruits eaten during the study were documented as bananas, apples, and/or grapes. Vegetable preference for the participants was negligible with only one participant documenting vegetable intake at 2.3% of the entire diet. The other

three participants did not report any vegetables. Across all participants many food items were repeated. Items such as pizza, chips, hot dogs, pasta, and individual snack cakes were foods frequently logged and at many times more than once a day. Juices and other non-dairy sweetened beverages were only recorded by one participant; therefore, not included in the examination of food choices.

Participant	Food Groups				
	Fruits	Vegetables	Starches	Proteins	Dairy
1	0.7%	2.3%	54%	35%	8%
2	3.7%	0%	67.5%	26.8%	2%
3	3.8%	0%	68.8%	22%	5.4%
4	0%	0%	66%	30.8%	3.2%

Table 1: Food selectivity in obese adolescents with ASD.

Discussion

This study is the first to describe food selectivity in adolescents with ASD and demonstrates that the adolescents were distinctively selective in the type of food items they chose. Similar to other studies published [1-2,4,11,12], adolescents with ASD preferred the energy dense foods such as chips, cakes, hot dogs, and pizza. This preference may contribute to obesity in adolescents with ASD. Adolescent obesity rates are rising, and adolescents with ASD are particularly vulnerable due to hallmark characteristics related to the disorder. Families typically focus on the problematic features with less regard for food and healthy lifestyle choices. Improved food choices may not be offered in an attempt to maintain mealtime routine and decrease disruptive mealtime behavior [16,17].

Many of the food choices of the participants may have lacked many nutrients needed to meet the estimated average requirement. Previous research of younger children with ASD demonstrates that children with ASD have much more nutritional inadequacies than typically developing peers [1,2,18]. These nutritional deficiencies may effect growth and development, compound gastrointestinal system issues, or create metabolic abnormalities [8]. Food fortified with nutrients may be an optimal solution for meeting nutrient intake while working toward a more diverse food repertoire.

Subsequent studies on food selectivity in obese adolescents with ASD should address some of the limitations of this study. For example, this paper is purely descriptive and does not analyze the nutrient contents of food selected. Understanding nutrient deficiencies may serve as a guide for increasing food diversity and improving healthy lifestyle choices. Most of the food choices made by the participants were foods high in sugar content such as cakes, pizza, white bread, cookies, etc. These foods are on the medium to high end of the glycemic index, a ranking of carbohydrates and how they affect blood glucose levels. Researchers may want to examine the effects of blood glucose levels after consumption of high glycemic index foods, behavior changes, and food preferences related to taste (sweet, salty, sour).

Limited food repertoire can become problematic for families attempting to make healthy lifestyle choices. This study only collected food logs and did not offer any dietary component to improve health. Future research should address treatment options to expand food

selections for improved food choices. Matson and Fodstad [19] reported treatment options of food selectivity in children with ASD. Applied behavior analysis has been the treatment of choice with feeding problems such as behavioral momentum procedure, variations of response cost, differential reinforcement plus response cost, positive reinforcement, a functional analysis demonstrating escape from demands as the maintaining function, and simultaneous presentation. Similar to this study, these interventions were single case designs which allow for exploration of an individual's characteristics on treatment outcomes but limit generalizability. Group methodologies provide improved comparison of various treatments.

Food logs were self and/or parent report which may create biases. Parents and the adolescents may have intentionally underreported poor food choices and/or amounts actually consumed. Furthermore, the length of the study (12 weeks of intervention phases) may have become burdensome for logging food consumption and resulted in underreporting. Collection of intake data could diminish this bias and may capture a truer snapshot of food consumed. Parental attitudes, behaviors, and restrictive eating patterns should also be examined to determine if these affect the adolescents with ASD food selectivity. Also, utilizing questionnaires for feeding problems may elucidate information not captured with food logs and intake data. Several psychometric assessments that may offer solutions for capturing data are the Brief Autism Mealtime Behavior Inventory (BAMBI) [19,20], the Youth/Adolescent Food Frequency Questionnaire (YAQ) [1,2], and the Parent Mealtime Action Scale (PAMS) [20].

Conclusion

This paper describes the food selectivity in obese adolescents with ASD. As reported previously, there are no reports of food selectivity in this particular population. While preliminary and purely descriptive, these findings provide insight to older youth with ASD and food selectivity. Given the accumulating evidence of documented food selectivity in children with ASD, it is critical that future research explore solutions for improved food choices among obese adolescents with ASD to improve health lifestyle choices and health outcomes.

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