

# Obesity in Children with Autism Spectrum Disorders

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2009

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# **ABSTRACT**

**Objective:** Little data exist on the prevalence of obesity in children with autism spectrum disorders. This report describes findings on body mass index (BMI) and the effect of medication treatment history on BMI in a population of children screened for an on-going federally-funded long-term study of olanzapine in autism.

**Methods:** In all, 110 children (89 males and 21 females) aged 3 to 12 years (mean, 7.07 ± 2.5), with a diagnosis of autism spectrum disorder (ASD), were screened for the study. Data collection included demographic information, BMI and BMI percentile, and past and current histories of medication treatment. The CDC criteria<sup>1</sup> were used to categorize children as obese ( $\geq 95^{\text{th}}$  percentile for BMI), overweight ( $85^{\text{th}} \leq x < 95^{\text{th}}$  percentile), healthy ( $5^{\text{th}} \leq x < 85^{\text{th}}$ ), and underweight ( $< 5^{\text{th}}$  percentile). Weight categories were cross-tabbed with medication use indicator variables and chi-square statistics used to test for statistical significance (5% alpha error tolerance). Continuous BMI distributions were also compared across medication use categories. Gender differences in BMI and medication use were also considered, with analyses completed also stratified by gender.

**Results:** Overall, thirty-one (28.1%) of the children were obese, twenty (18.1%) overweight, fifty-six (50.9%) healthy weight, and 3 (2.7%) underweight. A greater proportion of current (40%) as well as past (33%) users of antipsychotics were obese than those never treated with this drug class (25%). Past users of stimulants appeared heavier than those never having been treated with this medication class (57% vs. 44% either obese or overweight); current stimulant users had similar categorical BMI distributions as those never having received stimulant treatment. None of these differences attained statistical significance and no other marked differences in BMI distributions were noted for other medication classes; sample sizes in other medication classes were very small. Males were significantly more obese and overweight than females (chi-square p-value=0.04). Medication use was more common among males, but it was only statistically significant for any past stimulant use. To guard against confounding by gender, analyses were restricted to male gender and results were similar to those of the full cohort (there were insufficient numbers of female patients to support analyses in girls only).

**Conclusion:** The rates of obesity in this population with ASD was greater than that previously reported in other ASD populations<sup>2, 3, 4</sup>, and rates of obese children in our sample were above those reported in the general population<sup>5</sup>. There was a trend towards children with a history of past or present antipsychotic use having a higher BMI than non-users. In contrast, current users of stimulants had comparable BMIs to those of stimulant non-users.

## **OBJECTIVE**

- Autism spectrum disorders (autistic disorder, pervasive developmental disorders not otherwise specified, and Asperger's disorder) are developmental disorders that affects one in 150 children<sup>6</sup>.
- They are characterized by marked impairment in reciprocal social interactions, language and communication, and a pattern of repetitive and stereotypical behaviors.
- Atypical antipsychotics are used with increasing frequency in this population for the management of associated behaviors such as irritability and mood lability.
- Despite their efficacy, atypical antipsychotics are associated with significant weight gain
- The rates of obesity in children and adolescents in the general population have continued to escalate over the past 20 years: 31.9% of children and adolescents (ages 2-18 year) are overweight and 16.3% are obese<sup>5</sup>.
- Limited work has been done evaluating rates of obesity in ASD:
  - Whiteley and colleagues have reported that in a sample of 50 boys diagnosed with ASD, 42% were above the cut-off for being overweight and 10% for obesity<sup>2</sup>.
  - Most recently, Curtin et al. reported results from a retrospective chart review of 42 children with ASD. They found that 35.7 % of these children were overweight and 19% were obese<sup>3</sup>.
- We examined BMI trends and its association with past and present medication use in the screening database of an ongoing double-blind, placebo controlled treatment study of olanzapine in children with autism.

# METHODS

- In all, 186 clinically referred subjects completed a telephone screening and psychiatric diagnostic evaluation from May, 2003 to September, 2008 for an ongoing federally funded, double-blind placebo controlled study of olanzapine in children with autism.
- Of those screened, 164 (88.2%) met diagnostic criteria for ASD based on the DSM-IV<sup>TR</sup> 7.
- Complete data sets were available and analyzed for 110 children (89 males and 21 females) aged 3 to 12 years (mean, 7.07 ± 2.5), with a diagnosis of autism spectrum disorder (autistic disorder, pervasive developmental disorder not otherwise specified, & Asperger's disorder).
- Data collection included demographic information, BMI and BMI percentile, and past and current histories of medication treatment. A second entry method was utilized to ensure the accuracy of the database.
- The CDC criteria <sup>1</sup> were used to categorize children as obese ( $\geq 95^{\text{th}}$  percentile for BMI), overweight ( $85^{\text{th}} \leq x < 95^{\text{th}}$  percentile), healthy ( $5^{\text{th}} \leq x < 85^{\text{th}}$ ), and underweight ( $< 5^{\text{th}}$  percentile).
- Proportions in the obese, overweight, and normal weight BMI categories (three patients met criteria for underweight and these were excluded from further analyses) were compared across medication use categories defined as: current users (includes patients also with past use), past users (no current users included), and never users. Medication classes examined included: antipsychotics, stimulants, anticonvulsants, or SSRIs. Chi-square tests were applied to the resulting series of 3x3 tables. We explored collapsing medication use categories (current and past use vs. never use, current vs. non-current use, etc.) and testing for deviation from expected distribution across 2x3 tables. Analyses were also repeated restricting to male patients only, because there were comparably fewer girls in the sample.

# RESULTS

**Table 1: Representative Studies**

	<b>Our Data</b>	<b>Ogden, 2008 <sup>(5)</sup></b>	<b>Curtin, 2005 <sup>(3)</sup></b>	<b>Whiteley, 2004 <sup>(2)</sup></b>
<b>Diagnosis</b>	ASD (n=110)	General Population	ASD (n=42)	ASD (n=50)
<b>Age</b>	3-12 yr (mean =7.07)	2-19 yr	2-18 yr (mean = 6.66)	2-12 yr (mean = 6.66)
<b>85<sup>th</sup>-94<sup>th</sup> %tile (overweight)</b>	18%	31.9%	35.7%	42%
<b>&gt;95<sup>th</sup> %tile (obese)</b>	28%	16.3%	19%	10 %

**Table 2**

<b>Demographic Data</b>	<b>N=110</b>
Age	3-12 years (mean, 7.07 ± 2.5)
Gender	
Male	89 (80.9%)
Female	21 (19.1%)
Race/Ethnicity	
Caucasian	70 (63.6%)
African American	36 (32.7%)
Hispanic	20 (18.2%)
Asian	2 (1.8%)
Other	2 (1.8%)

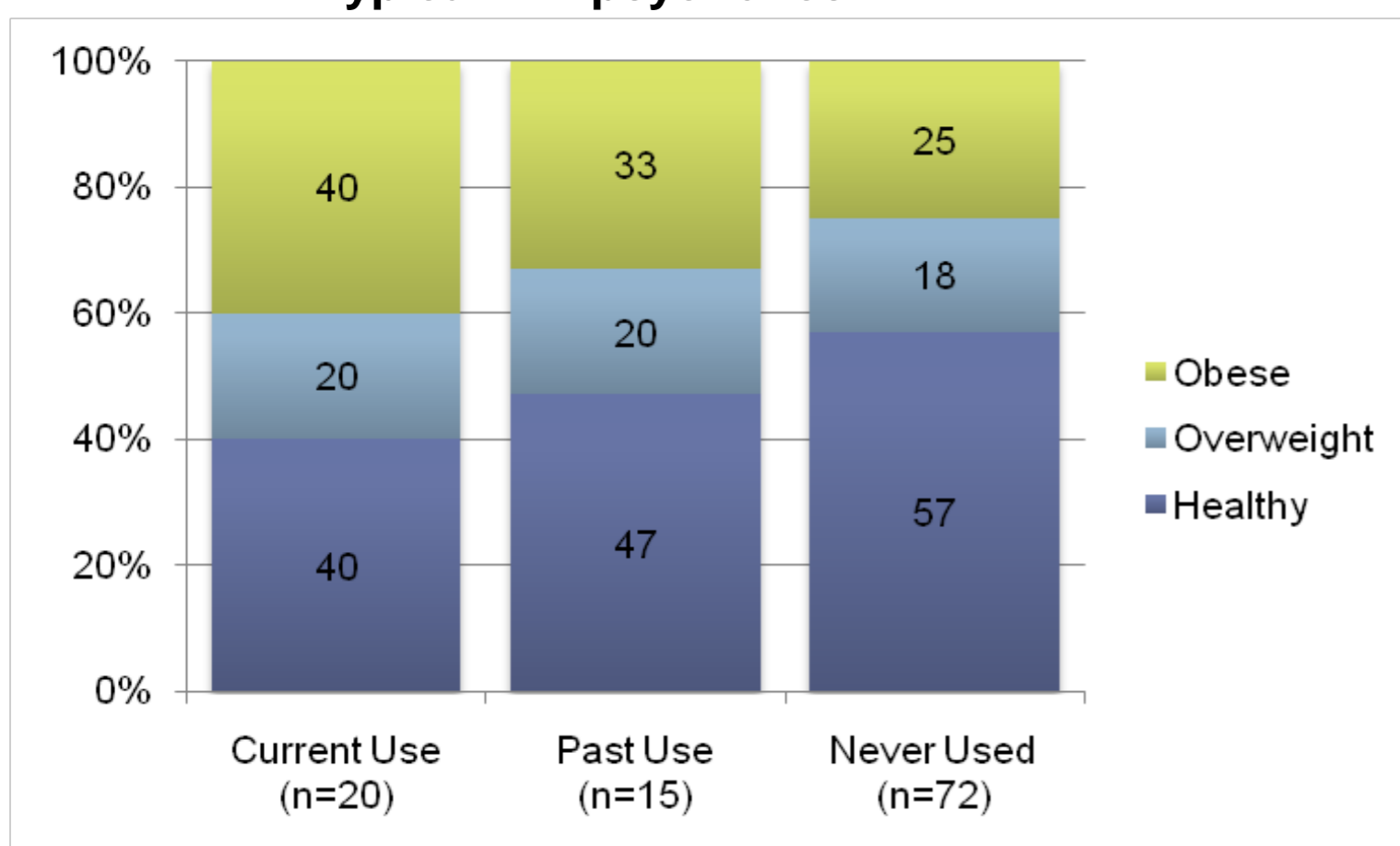
**Table 3**

<b>BMI Percentile</b>	<b>N=110</b>
$x < 5^{\text{th}}$	3 (2.7%)
$5^{\text{th}} \leq x < 85^{\text{th}}$	56 (50.9%)
$85^{\text{th}} \leq x < 95^{\text{th}}$	20 (18.2%)
$x \geq 95^{\text{th}}$	31 (28.1%)

**Table 4**

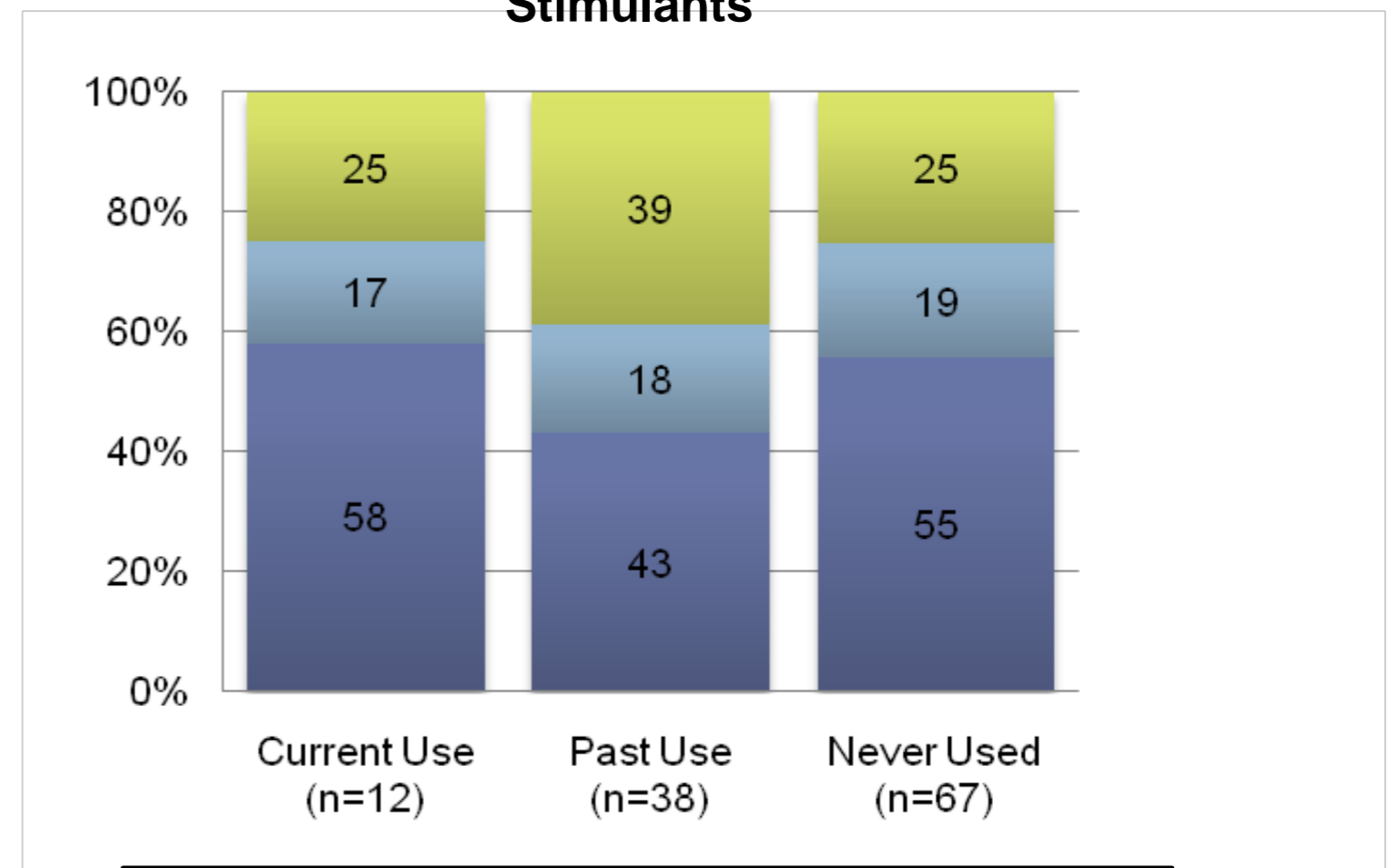
Medication Treatment History	( N=110)
Any Current Psychotropics	37 (33.6%)
Antipsychotics	20 (18.2%)
Stimulants	12 (10.9%)
Anticonvulsants	7 (6.4%)
SSRI	6 (5.5%)
Any Past Psychotropics	54 (49.1%)
Antipsychotics	22 (20%)
Stimulants	38 (34.5%)
Anticonvulsants	9 (8.2%)
SSRI	13 (11.8%)

**Atypical Antipsychotics**



Current and past users of antipsychotics were heavier than those having never been treated with antipsychotics.

**Stimulants**



Past users of stimulants tended to be heavier than those currently being treated with stimulants, as well as those having never been treated with stimulants.

## **CONCLUSION**

- At the time of screening, 34% of the sample was being treated with one or more psychotropic medications. In all, 49% of the sample had a history of past medication treatment.
- Among those being treated with medications at the time of screening, the most common class of drugs used was atypical antipsychotics (18%).
- Among those who had a past history of treatment with psychotropics, the most common class of drugs used was stimulants (35%).
- The rate of obesity in our population of children with ASD was greater than what has been previously reported in the general population, as well as in other ASD cohorts.
- The rate of overweight children in this study population was significantly lower than what has been reported in the general population, as well as in other ASD cohorts.
- Current users of antipsychotics had a higher rate of obesity as compared to past and non-users.
- Past stimulant users at the time of the screening were more overweight or obese as compared to stimulant non-users and those currently being treated with stimulants.
- Males were more obese and overweight than females (chi-square p-value=0.04). Males were also more likely to be treated with medications (statistical significance was only reached for prior stimulant use).

## **REFERENCES**

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