Body Mass Index in Children with Autism and Typical Controls

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Background

Relatively little data are available on body mass index (BMI) in children with autism. Curtin et al. (2005) conducted a chart review of a sample of 42 children with Autism Spectrum Disorders (ASDs) and reported 19% overweight and 36% to be at-risk for overweight, concluding that, as with typically developing children, overweight is a concern among children with ASDs. Bandini et al. (2005) examined NHANES data on the 11% of children in that sample receiving special education or early intervention services (no ASD group specifically identified) and found no difference in the prevalence of overweight or at-risk for overweight. Here we report on cross-sectional patterns in BMI from ages 3 to 17 in children with autism and typical controls selected from a large national sample survey.

Methods

Study Design:

Subjects were selected from the National Survey of Children’s Health, a random probability sample of 102,353 US children (ages 0 to 17). All data were collected cross-sectionally and were self-reported by parents/guardians on telephone interviews.

Study groups:

- Autism (n=483): age 3-5 (n=81), age 6-11 (n=228), age 12-17 (n=173)
- Typical controls (n=58,953): age 3-5 (n=13,398), age 6-11 (n=21,787), age 12-17 (n=23,768)

Outcome measures:

- BMI: calculated from parent-reported current height and weight

Covariates:

- Child’s age: coded in three categories 3-5, 6-11, and 12-17
- Child’s race: coded as White v.s. Others
- Household poverty level: calculated based on DHHS guidelines (<100%, 100-184%, 185-299%, >=300%, and missing categories)
- Physical activities: “during the past week, on how many days did the child exercise or participate in physical activity for at least 20 minutes that made [him/her] sweat and breathe hard?” (range 0-7)
- Number of children in the household: coded as 1, 2, 3 or more

Statistical analysis:

- Child sex and age-specific distributions of parent-reported BMI in the two study groups were compared to the US standard distribution from CDC growth curves. Overweight is defined as greater than the 95th percentile, at-risk for overweight as greater than the 85th percentile, and underweight as below the 10th percentile [Hedley, 2004]
- Regression models were also fit to test for differences in BMI across autism and typical control groups and to assess whether this association was modified by child sex or age.
- Methods of variance estimation accounting for the complex sample design (multistage sampling with weighting) were applied. Specifically, standard errors were obtained using the Taylor-series approximation method

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Results

- Weighted median and inter-quartile range of BMI values for ages 3-5, 6-11, 12-17 were: 17.36 (15.62, 20.54), 17.58 (15.67, 23.43), and 21.63 (18.26, 25.68), respectively, in autism group; and 17.14 (15.25, 20.06), 18.31 (15.67, 21.70) and 20.90 (18.88, 23.62) respectively, in typical control group.
- Significantly higher prevalence of overweight and at-risk for overweight were observed in autism group as compared to typical control group (see Table 1).
- The distribution of parent-reported BMI among children with ASD in this sample was skewed toward low and high values, compared to typical controls, suggesting greater prevalence of more extreme BMI among children with ASDs.
- Differences between autism and typical controls were not statistically significant at the p<0.05 level in models that adjusted for age, race, household poverty, and number of children in the household. Additional adjustment for physical activity level did not alter the associations. Models testing for interaction offered no statistical evidence suggesting BMI differences depended on child sex or age.

Discussion

The few previous studies available have reported that while overweight and at-risk for overweight are prevalent among children with ASDs, the problem is not greater in this group than in typically developing children. In our analyses of continuous BMI, although at older ages among children with autism were slightly heavier than controls, the difference was not beyond what could be expected due to chance variation. However, we did see significant differences across autism and typical control groups in the prevalence of overweight and at-risk for overweight. BMI in children with autism might be expected to differ from that of typical controls because of dietary patterns, opportunities for physical activity, and metabolic factors. However, since we did not see a wholesale shifting of the BMI distribution, but rather a stretching of the distribution with more ASD children in the tails, it is also worth considering whether ASD cases with extreme body habitus might be groups of etiologic significance. Caution must be exercised in interpreting these data because BMI measures come from parent self-report as opposed to direct assessment and because these measures suggest that the prevalence of at-risk for overweight and overweight is higher in this sample than in other national samples. Hedley et al. (2004) reported prevalence of at-risk for overweight ranging from 20.9 to 32.7 and prevalence of overweight ranging from 9.4 to 15.5 depending on age and gender – lower than that seen in typical controls here.