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### Long-Term Effects of ADHD Medication on Adult Height: Results From the NESARC

**To the Editor:** Methylphenidate is the most commonly prescribed medication to treat attention-deficit/hyperactivity disorder (ADHD) in children and adolescents. The long-term impact of methylphenidate on adult height remains debated<sup>1</sup> because a significant negative impact on children's growth has been suggested. The Multimodal Treatment Study of ADHD showed that children receiving methylphenidate had heights of 0.17 standard deviations below the population mean at the age of 9 years.<sup>2</sup> It has been suggested that height velocity is negatively affected by methylphenidate early in the treatment period, with a normalized growth later on.<sup>3</sup> As evidence, Biederman et al<sup>4</sup> found no significant association between adult height and methylphenidate in a longitudinal study of 124 patients treated for ADHD during childhood. To our knowledge, this association has never been examined in a larger sample of adult individuals with a lifetime diagnosis of ADHD.

**Method.** Using data from the 2004–2005 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a nationally

**Table 1. Demographic Variables and Adult Height in Participants With a DSM-IV Diagnosis of ADHD Who Received Stimulant Medication, in Those Who Never Received Stimulant Medication, and in Participants Without a Diagnosis of ADHD in the 2004–2005 NESARC<sup>a</sup>**

Variable	ADHD With Stimulant	ADHD Without Stimulant	Control	Wald <i>F</i> ( <i>P</i> value)
Total sample	N = 216	N = 591	N = 34,652	
Age, y, mean (SE)	35.93 (0.84)	41.01 (0.63)	48.38 (0.18)	102.67 (<.001) <sup>b</sup>
Sex, % (SE)				4.72 (.032) <sup>b</sup>
Male	56.54 (3.98)	59.51 (2.37)	47.64 (0.35)	
Female	43.46 (3.98)	40.49 (2.37)	52.36 (0.35)	
Race/ethnicity, % (SE)				5.09 (<.001) <sup>c</sup>
White	82.77 (3.00)	77.01 (2.13)	70.71 (1.60)	
Black	5.59 (1.56)	8.47 (1.19)	11.14 (0.71)	
Native American	3.35 (1.31)	3.69 (1.01)	2.15 (0.19)	
Asian	1.70 (1.00)	1.62 (0.66)	4.34 (0.53)	
Hispanic	6.59 (1.66)	9.21 (1.60)	11.66 (1.22)	
Height, in, mean (SE)	68.29 (0.34)	67.90 (0.23)	66.93 (0.05)	15.23 (<.001) <sup>b</sup> ; adjusted, 1.64 (.202) <sup>d</sup>
<b>Female</b>	<b>N = 111</b>	<b>N = 266</b>	<b>N = 19,712</b>	
Age, y, mean (SE)	38.58 (1.21)	41.38 (1.06)	49.17 (0.20)	36.07 (<.001) <sup>b</sup>
Race/ethnicity, % (SE)				4.32 (<.001) <sup>c</sup>
White	80.96 (4.18)	80.77 (2.30)	70.42 (1.61)	
Black	7.17 (2.28)	8.63 (1.56)	12.02 (0.76)	
Native American	4.31 (2.29)	2.65 (1.20)	2.29 (0.22)	
Asian	1.83 (1.05)	0.57 (0.54)	4.27 (0.52)	
Hispanic	5.72 (1.81)	7.37 (1.39)	11.00 (1.21)	
Height, in, mean (SE)	64.79 (0.11)	64.66 (0.43)	64.80 (0.11)	0.06 (.938) <sup>b</sup> ; adjusted, 0.59 (.556) <sup>e</sup>
<b>Male</b>	<b>N = 105</b>	<b>N = 325</b>	<b>N = 14,134</b>	
Age, y, mean (SE)	33.88 (1.11)	40.76 (0.82)	47.51 (0.21)	49.43 (<.001) <sup>b</sup>
Race/ethnicity, % (SE)				2.07 (.052) <sup>c</sup>
White	84.16 (3.86)	74.45 (3.01)	71.04 (1.65)	
Black	4.37 (2.12)	8.36 (1.73)	10.16 (0.69)	
Native American	2.60 (1.53)	4.40 (1.37)	2.01 (0.21)	
Asian	1.61 (1.58)	2.32 (1.04)	4.42 (0.61)	
Hispanic	7.26 (2.62)	10.47 (2.32)	12.37 (1.26)	
Height, in, mean (SE)	71.03 (0.37)	70.35 (0.22)	70.29 (0.10)	3.54 (.035) <sup>b</sup> ; adjusted, 0.52 (.598) <sup>e</sup>

<sup>a</sup>Percentages and means are weighted values.

<sup>b</sup>Wald *F* examining difference across groups was estimated using Wald *F* statistics with *df* = 1,65.

<sup>c</sup>Wald *F* examining difference across groups was estimated using Wald *F* statistics with *df* = 4,65.

<sup>d</sup>Wald *F* adjusted for sex, race/ethnicity, and age was estimated using Wald *F* statistics with *df* = 7,65.

<sup>e</sup>Wald *F* adjusted for race/ethnicity and age was estimated using Wald *F* statistics with *df* = 6,65.

Abbreviations: ADHD = attention-deficit/hyperactivity disorder, NESARC = National Epidemiologic Survey on Alcohol and Related Conditions.

representative survey,<sup>5</sup> we investigated the long-term impact of ADHD medications on adult height in naturalistic conditions. In a recent study using data from the NESARC, Bernardi et al<sup>6</sup> identified 807 subjects with a DSM-IV diagnosis of ADHD among whom 27.6% reported having received specific medication for ADHD. We compared adult height between 3 mutually independent groups: (1) participants with a lifetime DSM-IV diagnosis of ADHD who received medication, (2) participants with a lifetime DSM-IV diagnosis of ADHD who never received medication, and (3) participants without such a condition. Multinomial logistic regressions were performed following adjustments for confounders known to affect height, ie, sex, age, and ethnicity. Analyses were also performed stratified by gender. Because of the weighting and clustering used in the NESARC design, all statistical analyses were performed using the Taylor series linearization method, a designed-based method implemented using SUDAAN, version 10 (RTI International, Research Triangle Park, North Carolina).

**Results.** Participants with ADHD who received medication (N = 216; mean treatment duration = 7.4 years [SE = 0.22]; median age at first prescription was 15.9 years; 36.2% [SE = 0.81%] of these participants with an actual medication usage) had a mean height of 68.29 inches [SE = 0.34]. Participants with ADHD who never received medication (N = 591) had a mean height of 67.90 inches (SE = 0.23),

and those without ADHD (N = 34,652) had a mean height of 66.93 inches (SE = 0.05). Following adjustments, no significant difference in height between groups was found (Wald *F* = 1.64, *P* = .202) (Table 1). Similar results were obtained when comparisons were stratified by sex. Also, no significant association between treatment duration and adult height was observed (total sample: Wald *F*<sub>7,65</sub> = 0.04, *P* = .834; female: Wald *F*<sub>6,65</sub> = 0.21, *P* = .652; male: Wald *F*<sub>6,65</sub> = 0.08, *P* = .781).

The strengths of this study lie in the naturalistic conditions and the large and nationally representative sample. Based on pharmacoepidemiologic studies,<sup>7,8</sup> we can reasonably consider that most of the participants who received specific medication for ADHD were treated with methylphenidate. Data on dose reduction, treatment discontinuation (eg, weekend breaks and summer breaks), and treatment interruption were not available in this study and have been positively associated with growth velocity.<sup>3,9,10</sup> Such interventions are commonly prescribed in case of significant slowdown in growth of children treated with methylphenidate and must therefore be taken into consideration in the interpretation of our results.

As did Biederman et al,<sup>4</sup> we found no significant association between height into adulthood and either ADHD or medication

treatment for ADHD. The slowdown in the growth observed in certain children treated with methylphenidate<sup>2</sup> for ADHD appears to be reversible.

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