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Demographic Differences Among a National Sample of US Youth With Behavioral Disorders

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Objective

This study's objective was to compare the demographic patterns in the diagnosed prevalence of attention-deficit/ hyperactivity disorder (ADHD) to oppositional defiant disorder and conduct disorder (ODD/CD) in a national sample, with consideration for children with both disorders. Prior to 2013, these frequently co-occurring disorders have been nosologically grouped together in the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*) as behavioral disorders with childhood onset.[1,2] However in the 2013 *DSM-5*, ADHD was grouped with neurodevelopmental disorders, and ODD and CD were grouped with disruptive disorders.[3] Investigating the epidemiology of ADHD and ODD/CD has the potential to inform efforts to diagnose, treat, and manage these disorders. This information is particularly relevant for pediatricians, who are the single largest group of diagnosing physicians, diagnosing approximately 39% of children with ADHD.[4]

Methods

Data from the 2011–2012 National Survey of Children's Health (NSCH) were analyzed; this telephone survey of parents and guardians (herein referred to as parents) included a variety of indicators of children's health and well-being.[5] The sampling frame comprised households screened for the National Immunization Survey, a continuous list-assisted random-digit-dialed survey. One child was randomly selected from households with any

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Author Contributions

SNV participated in study design, literature review, led the writing of the manuscript, and approved the final version as submitted. ELD participated in study design, conducted the preliminary data analyses, and approved the final version as submitted. RHB participated in review of analyses, critically reviewed the manscript, and approved the final version as submitted. JRH conducted the geographic information system analyses, critically reviewed the manuscript, and approved the final version as submitted. MLD participated in study design, conducted statistical analyses, participated in writing the manuscript, and approved the final version as submitted.

Authors' Note

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or the Health Resources and Services Administration.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

children under the age of 18 as the interview subject. The survey completion rate was 54.1% for the landline sample and 41.2% for the cell phone sample; the overall survey response rate was 23.0%.[5] The analyses were restricted to children aged 4 to 17 years with valid responses on sex and both of the diagnosis variables of interest (n = 75 778).

The diagnosis variables were 2 questions asking the parent whether a doctor or other health care provider ever told them that the child had “attention deficit disorder or attention-deficit/ hyperactivity disorder” or, separately, “behavioral or conduct problems such as oppositional defiant disorder or conduct disorder.” If the parents responded affirmatively, they were asked whether the child currently had the condition. Prevalence estimates, prevalence ratios, and corresponding 95% confidence intervals were computed for 3 mutually exclusive groups of current disorder: ADHD-alone, ODD/CD-alone, and co-occurring ADHD + ODD/CD, both nationally and by age, sex, highest household education level, race, ethnicity, primary language in the household, household income categorized relative to the federal poverty level (FPL), and health insurance. Poverty level was multiply imputed by the National Center for Health Statistics (5 imputations) for 9.4% of respondents with missing household income data. SAS-callable SUDAAN accounted for NSCH’s complex survey design. Weights were adjusted for nonresponse and demographic factors; weighted estimates are nationally representative of the population of children aged 4 to 17 years in the United States. Weighted logistic regression models were run, modeling each diagnostic indicator from each of the demographic factors. State-based estimates of each disorder combination were grouped and mapped by prevalence quintile.

Results

Among children aged 4 to 17 years in 2011–2012, 8.8% had current ADHD (5.1 million) and 3.4% had current ODD/CD (1.9 million). State-based rates of each disorder varied, with rates generally lower in the West (Figure 1). However, the regional rates of ODD/CD alone were not significantly different (Table 1), suggesting that the regional variation seen in ODD/CD may be due to co-occurring ADHD. ADHD and ODD/CD frequently co-occurred (1.3 million); 25.7% of children with ADHD had ODD/CD and 67.0% of children with ODD/CD had ADHD. Males were at least 50% more likely than females to be in any of the 3 condition categories (Table 1). Children aged 15 to 17 years were more likely than those aged 4 to 10 years to have ODD/CD-alone, while children aged 11 to 17 years were more likely than those aged 4 to 10 years to have ADHD-alone. Black children were more likely than white children to have ADHD + ODD/CD, while white children were more likely than other children to have ADHD-alone.

Non-Hispanics were more than twice as likely as Hispanics to have ADHD-alone, but were not more likely to have either ODD/CD-alone or ADHD + ODD/ CD. Children living in households with a primary language other than English were less likely to have ADHD, with or without ODD/CD, but were similarly likely to have ODD/CD-alone. ODD/CD with or without ADHD was more common in children from households below 200% of the FPL and those in Medicaid compared to those with non-Medicaid insurance; neither was the case for children with ADHD-alone. Among children without health insurance, the rate of ADHD-alone was less than half that of children with either type of health insurance.

Discussion

These descriptive analyses revealed a few similarities and a number of important differences in the distribution of children with ADHD and ODD/CD, by demographic group. The prevalence ratios by sex were significantly different across all 3 condition groups, and there was no difference in ODD/CD-alone by race, ethnicity, primary language in the home, and region. However, rates of ODD/CD with or without ADHD were significantly higher among children in poverty and in Medicaid. Whites were more likely to have a diagnosis of ADHD without ODD/CD, and region of residence was significantly associated with ADHD with or without ODD/CD. Collectively, these findings suggest distinct patterns in the relationship between socioeconomic factors and prevalence of current ODD/CD and ADHD and their co-occurrence.

A limitation of this study was that the data did not allow for separate analyses of ODD and CD. Previous studies have indicated that ODD is more prevalent than CD among preadolescents, whereas CD is more common among adolescents[6]; therefore, the demographic patterns in this study may be more representative of children with ODD than CD. This study is also subject to the limitations of parent-report surveys, including report of behavioral diagnoses that have not been clinically validated and the potential bias introduced by lower response rates.[7]

Previous research has documented the high rate of co-occurrence of ADHD, ODD, and CD, with at least one third of children with ADHD also meeting criteria for ODD or CD[6,8]; however, the demographic patterns in the prevalence of these disorders have not been well characterized. This descriptive study used parent survey data from a large national sample and identified distinct epidemiologic patterns for ADHD and ODD/CD and their co-occurrence. These data further support the noso-logical distinction of ADHD and ODD/CD in *DSM-5*, their unique treatment parameters,[3,9–12] and suggest that there may be different factors related to patterns of diagnosis and/or underlying disorder etiology.

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References

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4. Washington, DC: American Psychiatric Association; 2000. Text Revision
2. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4. Washington, DC: American Psychiatric Association; 1994.
3. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5. Arlington, VA: American Psychiatric Association Publishing; 2013.
4. Visser S, Zablotsky B, Holbrook J, Danielson M, Bitsko R. Diagnostic experiences of children with attention-deficit/hyperactivity disorder. Natl Health Stat Report. 2015; (81):1–7.
5. Centers for Disease Control and Prevention. [Accessed December 9, 2015] National Survey of Children's Health frequently asked questions. 2011–2012. http://www.cdc.gov/nchs/slaits/nsch.htm

6. Maughan B, Rowe R, Messer J, Goodman R, Meltzer H. Conduct disorder and oppositional defiant disorder in a national sample: developmental epidemiology. J Child Psychol Psychiatry. 2004; 45:609–621. [PubMed: 15055379]

7. Visser SN, Danielson ML, Bitsko RH, et al. Trends in the parent-report of health care provider-diagnosed and medicated attention-deficit/hyperactivity disorder: United States, 2003–2011. J Am Acad Child Adolesc Psychiatry. 2014; 53:34–46. e2. [PubMed: 24342384]

8. Harty SC, Miller CJ, Newcorn JH, Halperin JM. Adolescents with childhood ADHD and comorbid disruptive behavior disorders: aggression, anger, and hostility. Child Psychiatry Hum Dev. 2009; 40:85–97. [PubMed: 18597170]

9. American Academy of Child and Adolescent Psychiatry. Practice parameter for the assessment and treatment of children and adolescents with attention-deficit/ hyperactivity disorder. J Am Acad Child Adolesc Psychiatry. 2007; 46:894–921. [PubMed: 17581453]

10. Wolraich M, Brown L, Brown RT, et al. Subcommittee on Attention-Deficit/Hyperactivity Disorder; Steering Committee on Quality Improvement and Management. ADHD: Clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyper-activity disorder in children and adolescents. Pediatrics. 2011; 128:1007–1022. [PubMed: 22003063]

11. Steiner H. Practice parameters for the assessment and treatment of children and adolescents with conduct disorder. American Academy of Child and Adolescent Psychiatry. J Am Acad Child Adolesc Psychiatry. 1997; 36(10 suppl):122S–139S. [PubMed: 9334568]

12. Steiner H, Remsing L. Practice parameter for the assessment and treatment of children and adolescents with oppositional defiant disorder. J Am Acad Child Adolesc Psychiatry. 2007; 46:126–141. [PubMed: 17195736]

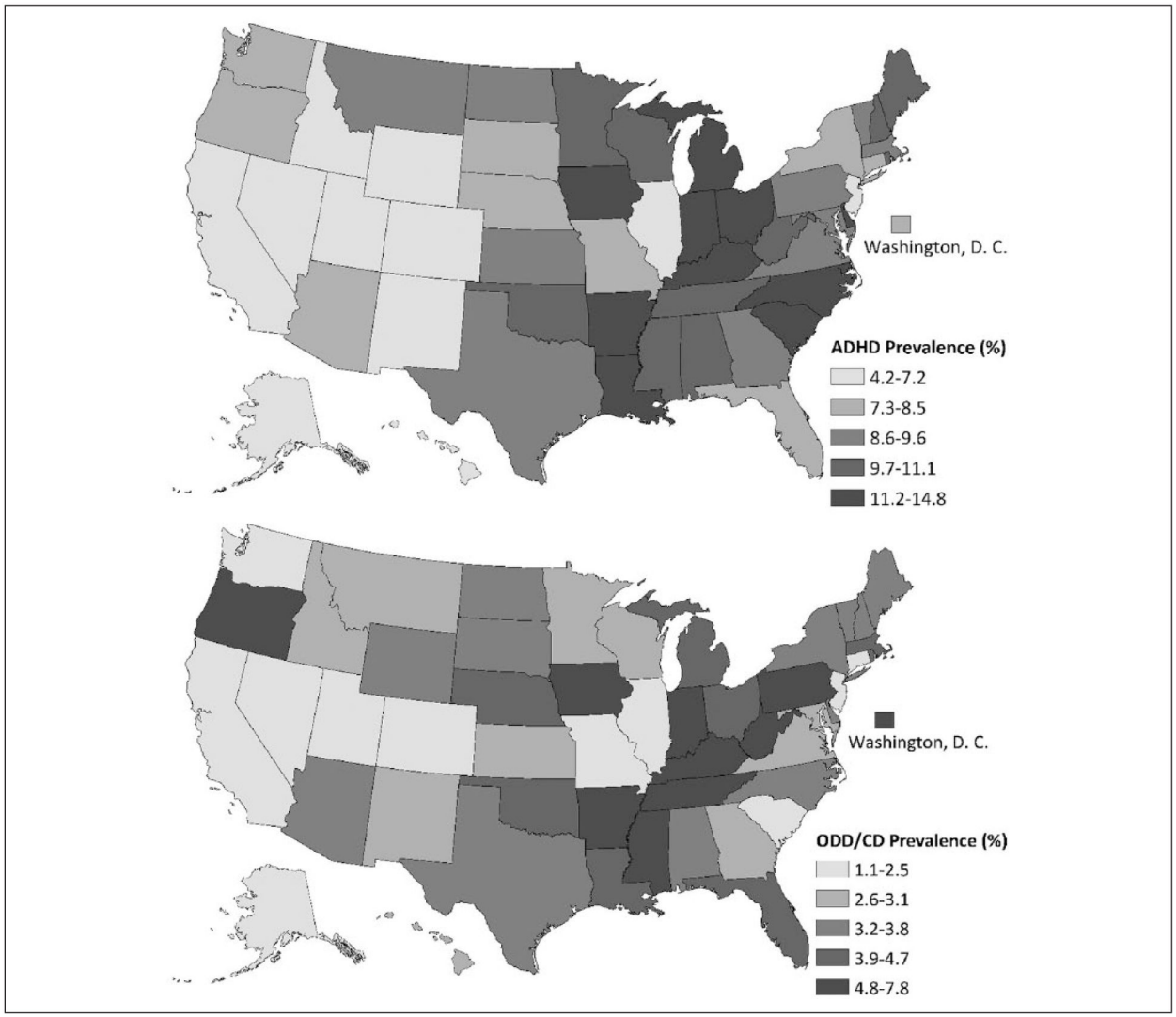

Figure 1.

State-based prevalence of attention-deficit/hyperactivity disorder (ADHD) and oppositional defiant disorder or conduct disorder (ODD/CD) among children 4 to 17 years of age, 2011–2012.

Note. State-based estimates of each disorder were grouped by prevalence quintile.

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Table 1

Demographic Characteristics of Children Aged 4 to 17 Years With Current ODD/CD-Alone, ADHD-Alone, or Co-occurring ADHD and ODD/CD (ADHD + ODD/CD), 2011–2012[a].

		Current ODD/CD-Alone		Current ADHD + ODD/CD		Current ADHD-Alone	
	N	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)
National prevalence estimate	75 778	1.1 (1.0–1.3)		2.3 (2.0–2.5)		6.5 (6.2–6.9)	
Sex							
Male	39 157	1.3 (1.1–1.6)	**1.48 (1.06–2.04)**	3.3 (2.9–3.8)	**2.83 (2.21–3.64)**	8.7 (8.1–9.3)	**2.03 (1.79–2.30)**
Female	36 621	0.9 (0.7–1.2)	Ref.	1.2 (0.9–1.5)	Ref.	4.3 (3.9–4.8)	Ref.
Age in years							
4 to 10	36 123	0.9 (0.8–1.1)	Ref.	2.1 (1.8–2.5)	Ref.	4.6 (4.2–5.1)	Ref.
11 to 14	21 337	1.0 (0.7–1.4)	1.07 (0.72–1.60)	2.5 (2.1–3.0)	1.19 (0.94–1.52)	8.9 (8.1–9.8)	**1.92 (1.67–2.20)**
15 to 17	18 318	1.7 (1.3–2.4)	**1.89 (1.30–2.75)**	2.2 (1.8–2.8)	1.04 (0.78–1.38)	7.9 (7.0–8.8)	**1.71 (1.45–1.98)**
Race							
White	54 765	1.0 (0.9–1.2)	Ref.	2.1 (1.9–2.4)	Ref.	7.6 (7.1–8.2)	Ref.
Black	7582	1.3 (0.9–1.8)	1.25 (0.87–1.80)	3.5 (2.7–4.5)	**1.65 (1.24–2.20)**	6.0 (5.0–7.1)	**0.78 (0.65–0.94)**
Other	11 411	1.1 (0.7–1.8)	1.10 (0.68–1.79)	2.0 (1.6–2.6)	0.95 (0.71–1.27)	3.8 (3.2–4.5)	**0.49 (0.41–0.60)**
Ethnicity							
Hispanic/Latino	9648	1.2 (0.8–1.9)	1.10 (0.68–1.78)	1.9 (1.4–2.7)	0.80 (0.56–1.13)	3.6 (2.8–4.5)	**0.48 (0.38–0.61)**
Non-Hispanic/Latino	64 592	1.1 (0.9–1.3)	Ref.	2.4 (2.2–2.7)	Ref.	7.5 (7.0–7.9)	Ref.
Primary language in home							
English	70 298	1.2 (1.0–1.4)	Ref.	2.5 (2.3–2.8)	Ref.	7.5 (7.0–7.9)	Ref.
Any other language	5442	0.8 (0.4–1.7)	0.69 (0.33–1.44)	0.7 (0.3–1.6)	**0.29 (0.13–0.65)**	1.2 (0.8–1.9)	**0.16 (0.10–0.26)**
Percentage of federal poverty level (%)[b]							
<100%	10 645	1.7 (1.3–2.4)	**2.14 (1.42–3.23)**	4.6 (3.8–5.5)	**3.62 (2.74–4.77)**	6.3 (5.4–7.3)	0.94 (0.80–1.11)
100% to 199%	13 191	1.3 (1.0–1.7)	**1.64 (1.15–2.36)**	2.7 (2.2–3.3)	**2.13 (1.58–2.88)**	6.7 (5.9–7.6)	1.00 (0.86–1.17)
≥200%	50 552	0.8 (0.6–1.1)	Ref.	1.3 (1.0–1.6)	Ref.	6.7 (6.2–7.2)	Ref.
Any health care coverage							
Yes							
Medicaid	20 184	1.9 (1.6–2.4)	**2.84 (1.97–4.10)**	4.6 (4.0–5.2)	**4.61 (3.61–5.89)**	7.3 (6.6–8.0)	1.11 (0.98–1.26)
Non-Medicaid	51 338	0.7 (0.5–0.9)	Ref.	1.0 (0.8–1.2)	Ref.	6.5 (6.1–7.0)	Ref.

		Current ODD/CD-Alone		Current ADHD + ODD/CD		Current ADHD-Alone	
	N	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)
No	3365	0.7 (0.4–1.2)	1.05 (0.57–1.94)	1.0 (0.7–1.6)	1.05 (0.65–1.70)	3.0 (2.0–4.5)	**0.46 (0.31–0.69)**
Region							
Northeast	13 567	1.3 (1.0–1.8)	1.27 (0.73–2.23)	2.4 (1.8–3.1)	**1.72 (1.11–2.68)**	5.7 (5.0–6.4)	1.15 (0.91–1.46)
Midwest	17 823	1.0 (0.8–1.3)	0.95 (0.55–1.62)	2.6 (2.2–3.0)	**1.87 (1.27–2.77)**	7.4 (6.7–8.1)	**1.52 (1.21–1.90)**
South	25 252	1.2 (0.9–1.5)	1.12 (0.66–1.91)	2.6 (2.2–3.1)	**1.92 (1.30–2.84)**	7.5 (6.8–8.1)	**1.54 (1.23–1.92)**
West	19 136	1.0 (0.6–1.7)	Ref.	1.4 (1.0–2.0)	Ref.	5.0 (4.1–6.0)	Ref.

Abbreviations: ODD/CD-alone, oppositional defiant disorder or conduct disorder-alone; ADHD-alone, attention-deficit/hyperactivity disorder-alone; ADHD + ODD/CD, co-occurring ADHD and ODD/CD; PR, prevalence ratio; CI, confidence interval.

[a] CDC/NCHS, National Survey of Children's Health, 2011–2012.

[b] Includes multiply imputed values for 9.4% of respondents for which information on household income was missing.

Bold indicates statistical significance of the Prevalence Ratio at $p < 0.05$.