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Prevalence of Mental, Behavioral, and Developmental Disorders Among Children and Adolescents with Diabetes, United States (2016–2019)

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Abstract

Objective—To assess the association of diabetes and mental, behavioral, and developmental disorders in youth, we examined the magnitude of overlap between these disorders in children and adolescents.

Study design—In this cross-sectional study, we calculated prevalence estimates using the 2016–2019 National Survey of Children's Health. Parents reported whether their child was currently diagnosed with diabetes or with any of the following mental, behavioral, or developmental disorders: attention-deficit/hyperactivity disorder, autism spectrum disorder, learning disability, intellectual disability, developmental delay, anxiety, depression, behavioral problems, Tourette syndrome, or speech/language disorder. We present crude prevalence estimates weighted to be representative of the US child population and adjusted prevalence ratios (aPRs) adjusted for age, sex, and race/ethnicity.

Results—Among children and adolescents (aged 2–17 years; n = 121 312), prevalence of mental, behavioral, and developmental disorders varied by diabetes status (diabetes: 39.9% [30.2–50.4]; no diabetes: 20.3% [19.8–20.8]). Compared with children and adolescents without diabetes, those with diabetes had a nearly 2-fold higher prevalence of mental, behavioral, and developmental disorders (aPR: 1.72 [1.31–2.27]); mental, emotional, and behavioral disorders (aPR: 1.90 [1.38–2.61]) and developmental, learning, and language disorders (aPR: 1.89 [1.35–2.66]).

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Conclusions—These results suggest that approximately 2 in 5 children and adolescents with diabetes have a mental, behavioral, or developmental disorder. Understanding potential causal pathways may ultimately lead to future preventative strategies for mental, behavioral, and developmental disorders and diabetes in children and adolescents.

The prevalence of mental disorders among adults and youth with diabetes is greater than that in the general population in the US largely accounted for by higher prevalence of depression and anxiety.[1–4] Diabetes has been shown to co-occur with developmental[5] and learning disorders,[6] including attention-deficit/hyperactivity disorder (ADHD).[7] Even as the prevalence of both diabetes[8,9] and mental, behavioral, and developmental disorders[10,11] is on the rise among youth in the US,[10] there is limited understanding of the magnitude of overlap between mental, behavioral, and developmental disorders and diabetes among youth.

The relationship between mental, behavioral, and developmental disorders and diabetes may have multiple causal pathways, including common behavioral and environmental factors.[12] For example, lower socioeconomic status is known to be common among children with diabetes and mental, behavioral, or developmental disorders,[11,13] which is associated with economic, social, and environmental disadvantages such as decreased access to health care, lower income, and lower parental educational attainment. Moreover, insufficient physical activity is associated with increased prevalence of diabetes and some mental, behavioral, and developmental disorders.[14–16] Lastly, a pro-inflammatory profile characterized by high levels of inflammatory cytokines, cortisol, and leptin is common in both diabetes and depression.[17]

Much previous work has focused on mood disorders and diabetes.[18] Studies consistently demonstrate associations between depressive symptoms and worse glycemic control.[19,20] Depression in adolescence might influence the later development of type 2 diabetes.[21] Similarly, anxiety is associated with poor self-management and glycemic control in adolescents with type 1 diabetes.[22] Conversely, diabetes can trigger diabetes distress, which is observed in approximately one-third of adolescents with diabetes and characterized by subclinical negative emotions associated with inadequate self-management and poor glycemic control.[18]

Here, we examine prevalence of mental, behavioral, and developmental disorders among children and adolescents (2–17 years old) with and without diabetes using annual data from the 2016–2019 National Survey of Children's Health (NSCH). We also examined perceived severity of and treatment utilization for mental, behavioral, and developmental disorders among children with and without diabetes. Although NSCH does not distinguish between diabetes sub-types, results are most likely representative of type 1 diabetes which accounts for over 80% of diabetes diagnoses among children and adolescents under 20 years of age.[23]

Methods

This analysis used data from the 2016–2019 NSCH, an annual, cross-sectional, nationally representative population-based survey of households with noninstitutionalized children and adolescents ≤17 years of age in the US Eligible households were randomly selected from addresses drawn from the US Census Bureau Master Address File. A parent or

caregiver answered age-specific questionnaires (≤5 years, 6–11 years, 12–17 years) about one randomly selected child in their household. Survey questions covered the general health of the child, health care utilization, health insurance, family and household information, and neighborhood and community factors. NSCH is conducted by the US Census Bureau, and additional information is available online (https://mchb.hrsa.gov/data/national-surveys). This activity was reviewed by Centers for Disease Control and Prevention (CDC) and was conducted in consistent with applicable federal law and CDC policy (45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq).

The combined total sample size of respondents was 131 774 (2016: n = 50 212; 2017: n = 21 599; 2018: n = 30 530; 2019: n = 29 433). The present analytic sample excluded children ≤1 years of age (n = 9973) and those missing information on diabetes status (n = 489), yielding a final analytic sample of 121 312 children and adolescents.

Diabetes Status and Mental, Behavioral, and Developmental Disorders Outcome Measures

Parent-reported diabetes diagnosis was determined using the questions, “Has a doctor or other health care provider ever told you that (child name) has diabetes?” followed up by “If yes, does (child name) currently have the condition?” To increase specificity in identifying diabetes and as diabetes is a chronic condition, those reporting “no” to currently having diabetes were considered to not have diabetes (n = 70). The survey did not differentiate between type 1 and type 2 diabetes.

The mental, behavioral, and developmental disorders reported here fall into two categories: (1) mental, emotional, and behavioral disorders: ADHD, anxiety, depression, behavioral or conduct problems (defined here as disruptive behavior disorder), and Tourette syndrome, and (2) developmental, learning, and language disorders: autism spectrum disorder (ASD), intellectual disability, developmental delay, learning disability, and speech/language disorder.

The presence of current mental, behavioral, or developmental disorder diagnosis was a combined category based on parent report to individual questions on each mental, behavioral, or developmental disorder. Parents were asked the question, “Has a doctor or other health care provider ever told you that (child name) has (name of disorder)?” for ADHD, anxiety problems, depression, Tourette syndrome, and ASD. For disruptive behavior disorder, intellectual disability, developmental delay, learning disability, and speech/language disorder, parents were asked, “Has a doctor or other health care provider or educator ever told you that (child name) has (name of disorder)?” Examples of educators are teachers and school nurses. Current diagnoses were determined by a “yes” response to follow-up questions asking if the child currently has the disorder. Parents were told ADHD was defined as attention-deficit disorder or attention-deficit/hyperactivity disorder, ie., attention deficit disorder or ADHD; ASD was defined as autism or autism spectrum disease and included a diagnosis of Asperger disorder or pervasive developmental disorder; and intellectual disability as also known as intellectual disability. Parents were also asked to rate the severity of each mental, behavioral, or developmental disorder as 1 = mild, 2 = moderate, and 3 = severe.

Sociodemographic, Health Care, Family and Community Variables

Sociodemographic characteristics were sex, age (younger children aged 2–11 years and adolescents aged 12–17 years), race/ethnicity, parents' highest level of education, primary language, urban/rural metropolitan designation, family poverty ratio (ratio of prior-year total family income and US Census Bureau's family poverty threshold), and the child's current private or public health care coverage. Additional parent-reported characteristics were adequacy of mental health or behavioral insurance coverage (if the child was insured and had mental or behavioral health needs, the parent reports that health insurance offers benefits or covers services that meet mental or behavioral needs), health care utilization in the past 12 months, family factors (fair or poor parental mental or emotional health, fair or poor parental physical health, difficulty affording food and housing on the family's income, and lack of emotional support for the responding parent), and community factors (neighborhood without amenities, neighborhood in poor condition, lack of support in neighborhood, neighborhood perceived to lack safety). For more information, see the Appendix (available at www.jpeds.com).

Treatment Variables

Mental, behavioral, or developmental disorder treatment in the past year was based on available questions regarding receipt of behavioral treatment or developmental services or use of medication in the last 12 months. Behavioral treatment or services in the last 12 months was the parent's report of the child receiving any treatment or counseling from a mental health professional, behavioral treatment for ASD or ADHD, current special services to meet developmental needs (such as speech, occupational, or behavioral therapy), or current special education or early intervention services. Parents reported whether the child received medication for ADHD, ASD, or difficulties with emotions, concentration, or behaviors. Parents also reported whether it was a problem getting the mental health treatment or counseling that their child needed in the last 12 months.

Statistical Analyses

All estimates are weighted to be nationally representative of the US child and adolescent population and account for complex survey design. Demographic, health care, family, and community factors are presented as percentages with 95% CI. Children and adolescents with and without current diabetes were categorized by the presence of mental, behavioral, or developmental disorders; those with mental, behavioral, or developmental disorders were further grouped by the presence of any reported mental, emotional, or behavioral disorder, and any developmental, learning, or language disorder. Chi-square statistics were used to test differences across diabetes and mental, behavioral, and developmental disorder groups. Relative standard error (RSE) was calculated as the SE divided by the estimate and multiplied by 100. RSEs above 30% were considered unreliable, and those estimates are noted but not displayed. Tourette syndrome was not analyzed separately due to small sample sizes and RSEs >30%, preventing accurate estimation. Intellectual disability and developmental delay categories were combined because the RSE of intellectual disability alone approached 30%.

Age, sex, and race/ethnicity adjusted prevalence of mental, behavioral, and developmental disorders overall and among younger children aged 2–11 years and adolescents aged 12–17 years was computed using multivariable logistic regression with predictive margins. Among children and adolescents with mental, behavioral, and developmental disorders, we further estimated prevalence of severe or moderate mental, behavioral, and developmental disorders and receipt of treatment in children and adolescents with or without diabetes. Interaction between diabetes and age, sex, and race/ethnicity was examined. Analyses were conducted using SAS 9.4 (SAS Institute Inc.) and SUDAAN 11.0.3 (RTI International).

Results

Among children and adolescents aged 2–17 years in the US, the crude weighted prevalence of diabetes was 0.43% (95% CI: 0.34%–0.54%) and of mental, behavioral, and developmental disorders was 20.38% (19.89%–20.88%). The average age of individuals with diabetes was 13.0 years (95% CI: 12.3%–13.7%); the average age with current mental, behavioral, or developmental disorder was 10.7 years (10.6–10.8). The average age for current mental, emotional, or behavioral disorder was 11.5 years (11.4–11.6), and the average age for current developmental, learning, or language disorder was 9.7 years (9.5–9.9).

Demographics

Figure 1 shows participant characteristics, by diabetes and mental, behavioral, and developmental disorder status, and pairwise comparisons highlighting the association of diabetes and mental, behavioral, and developmental disorders between study groups. Groups with diabetes had a significantly higher proportions of adolescents, reflecting the expected age distribution of prevalent diabetes. Regardless of diabetes status, those with a mental, behavioral, or developmental disorder were significantly more likely to be male.

Across the remaining characteristics, the most consistent and significant differences were seen when comparing mental, behavioral, and developmental disorder status in children and adolescents without diabetes. Among children without diabetes, those with mental, behavioral, and developmental disorders displayed a higher probability of non-Hispanic White race/ethnicity, English as a primary language, family poverty ratio <100%, public-only health insurance, mental/behavioral coverage needed, sufficient mental/behavioral health insurance coverage, doctor visits, unmet mental and general health care needs, family problems, and community problems. Among children and adolescents with diabetes, those with mental, behavioral, and developmental disorders also had a higher probability of having public-only insurance and of mental/behavioral health care utilization. This group also displayed greater poverty and unmet mental health needs that did not reach statistical significance.

Few differences were detected between children without mental, behavioral, or developmental disorders; however, those with diabetes were more likely to have English as a primary language and utilize general health care. Among children with a mental, behavioral, or developmental disorder, those with diabetes displayed increased probability of non-Hispanic Black race/ethnicity and more public-only insurance. Increased poverty,

unmet general health care needs, and worse parental physical health did not reach statistical significance.

Prevalence of Mental, Behavioral, and Developmental Disorders by Diabetes Status

Children and adolescents between 2–17 years of age with diabetes more often had a mental, behavioral, or developmental disorder than those without diabetes (Figure 2). Those with diabetes had a nearly 2-fold higher adjusted prevalence of mental, behavioral, and developmental disorders (adjusted prevalence ratio [aPR]: 1.72 [1.31–2.27]); mental, emotional, and behavioral disorders (aPR: 1.90 [1.38–2.61]); and developmental, learning, and language disorders (aPR: 1.89 [1.35–2.66]), as well as all individual mental, behavioral, or developmental disorders. Similarly, the prevalence of diabetes was 0.33% (0.23%–0.45%) among children and adolescents without mental, behavioral, or developmental disorders and 0.84% (0.64%–1.11%) among children and adolescents with current mental, behavioral, or developmental disorders.

Children aged 2–11 years with diabetes had 2.5-fold higher prevalence of mental, behavioral, and developmental disorders (aPR: 2.45 [1.71–3.50]) and adolescents aged 12–17 years with diabetes had 1.5-fold higher prevalence of mental, behavioral, and developmental disorders (aPR: 1.50 [1.12–2.01]; Figure 3). Mental, emotional, and behavioral disorders were more prevalent among children and adolescents with diabetes within both age groups (2–11 years, aPR: 3.24 [2.14–4.90]; 12–17 years, aPR: 1.57 [1.15–2.14]), whereas developmental, learning, and language disorders were significantly more common only for adolescents with diabetes (aPR: 2.09 [1.45–3.02]). Among individual mental, emotional, or behavioral disorders (data not shown), all but ADHD were higher in younger children with diabetes. Among developmental, learning, or language disorders, only ASD prevalence was higher in younger children with diabetes. Among adolescents, all examined mental, behavioral, or developmental disorders were higher in adolescents with diabetes, with the exception of Tourette syndrome. Among younger children, significant interaction was observed between diabetes and race/ethnicity ($P = .009$), with the highest odds of prevalent mental, behavioral, or developmental disorders among non-Hispanic Black children with diabetes. However, stratified prevalence estimates had RSE>30%, thus are not reported.

Severity and Treatment of Mental, Behavioral, and Developmental Disorders

Among children and adolescents with a mental, behavioral, or developmental disorder, perceived parent-reported severe disruptive behavior disorder and all developmental, learning, and language disorders were more prevalent in children with diabetes than in children without diabetes (Figure 4). In age-stratified analyses (data not shown), the prevalence of severe developmental, learning, and language disorders was similarly elevated in both younger children (aPR: 1.56 [1.17–2.08]) and adolescents (aPR: 1.38 [1.09–1.75]). The prevalence of severe disruptive behavior disorder was higher among younger children with diabetes (aPR: 1.60 [1.38–1.85]), but not among adolescents. Utilization of treatment services or medication for mental, behavioral, or developmental disorders did not differ significantly by diabetes status (Figure 4).

Discussion

Children and adolescents with diabetes had significantly higher prevalence of all examined mental, behavioral, or developmental disorders, which were on average approximately 2-fold higher than in children and adolescents without diabetes. These findings are consistent with previous reports of higher anxiety and depression among individuals with diabetes[1–4,24] and are now extended to developmental and learning disabilities. Children and adolescents with diabetes had both greater prevalence of any and of severe developmental, learning, or language disorder as reported by parents.

Similar to prior findings,[25] mental, behavioral, and developmental disorders were associated with greater reported socioeconomic risks, such as lower family income, having public-only insurance, and reporting unmet health care needs. Although mental, behavioral, and developmental disorders were also associated with family and community problems in children without diabetes, these differences were not observed among children and adolescents with diabetes. It is possible that having diabetes compounded risk such that having a mental, behavioral, or developmental disorder did not make an additional difference; however, the small sample size in the group with both diabetes and mental, behavioral, or developmental disorders limits ability to assess this hypothesis.

Mental, emotional, and behavioral disorders were significantly higher in both younger children (aPR: 3.24) and adolescents (aPR: 1.57) compared with their peers without diabetes. The higher prevalence of mental, emotional, and behavioral disorders among younger children with diabetes could be due to factors such as a new diabetes diagnosis and potentially higher diabetes severity in younger children.[26,27] The highest likelihood for diagnosis of a psychiatric condition is during the first year after diabetes diagnosis, suggesting considerable stress and possible risk for mental, emotional, and behavioral disorder onset associated with diabetes diagnosis, which may be amenable to early intervention.[26] In the present study, mental, emotional, and behavioral disorder prevalence was slightly lower in older than younger children with diabetes. Differences in genetic and autoimmune profiles have been shown in youth with type 1 diabetes diagnosed at younger ages compared with older ages.[28,29] Earlier diagnosis (<7 years) with type 1 diabetes is associated with a more aberrant proinsulin processing and lower C-peptide levels than in children diagnosed at ≥13 years.[27] Additionally, younger children have higher rates of diabetic ketoacidosis at the time of diabetes diagnosis[30]; cortisol hypersecretion is associated with acute onset of diabetic ketoacidosis.[31] Whether a more severe endotype associated with earlier type 1 diabetes diagnosis is also associated with more severe mental health comorbidities warrants future investigation. Higher prevalence of depression has been reported among youth with type 2 diabetes than with type 1 diabetes.[32,33]

More than one-third of children and adolescents with diabetes were reported to have a mental, emotional, and/or behavioral disorder. Comparably, 20–30% of children and adolescents with diabetes screened for symptoms of depression or anxiety, with 20% of those reporting self-harm not having a documented referral to mental health services.[34] These findings underscore the need to implement mental health screening as a part of routine care in diabetes in children and adolescents, as well as facilitating proper follow-up when

children and adolescents show signs of mental disorders. Appropriate intervention may then improve outcomes such as glycemic control and quality of life.[35]

Higher prevalence of mental disorders is not unique to diabetes and is also observed among other chronic disorders, including coronary heart disease,[36] cancer,[37] and chronic obstructive pulmonary disorder.[38] In the present data set, secondary analysis of mental, behavioral, or developmental disorder prevalence among children and adolescents with allergies, arthritis, asthma, and heart conditions showed similar elevated burden of mental, behavioral, and developmental disorders compared with diabetes (data not shown), suggesting other chronic conditions could benefit from similar analyses for associations with mental, behavioral, and developmental disorders. Adding to the complexity in understanding those at risk, the association of mental, emotional, and behavioral disorders and diabetes is potentially bidirectional. For example, diabetes may put youth at higher risk for developing depression and anxiety, and depression may increase risk of type 2 diabetes.[19–21] In addition, our data suggest that enhanced support and intervention services are likely universally needed for youth with chronic disorders including, but not limited to, diabetes. Estimates of mental, behavioral, or developmental disorder treatment did not significantly differ by diabetes status in children and adolescents with mental, behavioral, or developmental disorders, suggesting children and adolescents with diabetes were getting similar levels of behavioral treatment, developmental services, and medications as their peers without diabetes. All groups reported high rates (>50%) of insufficient mental or behavioral health insurance coverage, supporting the need to improve access to mental health services among all children and adolescents.

This report is subject to several limitations. Estimates from NSCH rely on parent report of diagnosis by a health care provider or educator and parent estimate of mental, behavioral, or developmental disorder severity, both of which may be impacted by recall bias and misclassification error. This concern is mitigated by previous evidence of the validity of NSCH parent report in measuring ADHD and ASD.[39,40] NSCH did not include an exhaustive list of mental, behavioral, and developmental disorders, some of which may be important for children and adolescents with diabetes (eg, eating disorders). Therefore, the lack of reported mental, behavioral, and developmental disorders cannot be interpreted as complete absence of diagnoses. Furthermore, NSCH cannot distinguish diabetes type, limiting ability to capture differences in mental, behavioral, and developmental disorder burden between type 1 and 2 diabetes. However, in this age range, over 80% of diagnoses would be type 1 diabetes.[23] NSCH did not include questions on diabetes medication use, which would help to identify true cases of diabetes in this age group. The survey design is cross-sectional, thus preventing the ability to track individuals longitudinally and determine temporality. Finally, age-stratified individual mental, behavioral, or developmental disorder estimates were statistically unreliable due to small sample sizes and are not presented.

These results suggest a significant health burden, with approximately 2 in 5 children and adolescents with diabetes having a mental, behavioral, or developmental disorder. Future work examining the directionality of the relationship between mental, behavioral, and developmental disorders and diabetes, as well as potential causal pathways, could inform best practices for screening, comprehensive diagnoses, monitoring of children and

adolescents over time and development, and integrated treatment approaches when multiple diagnoses are present. Appropriate treatment and monitoring of both diabetes and mental, behavioral, and developmental disorders with multidisciplinary, collaborative care and a support team may be needed in children and adolescents with these disorders.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Glossary

ADHD	Attention-deficit/hyperactivity disorder
aPR	Adjusted prevalence ratio
ASD	Autism spectrum disorder
NSCH	National Survey of Children's Health
RSE	Relative standard error

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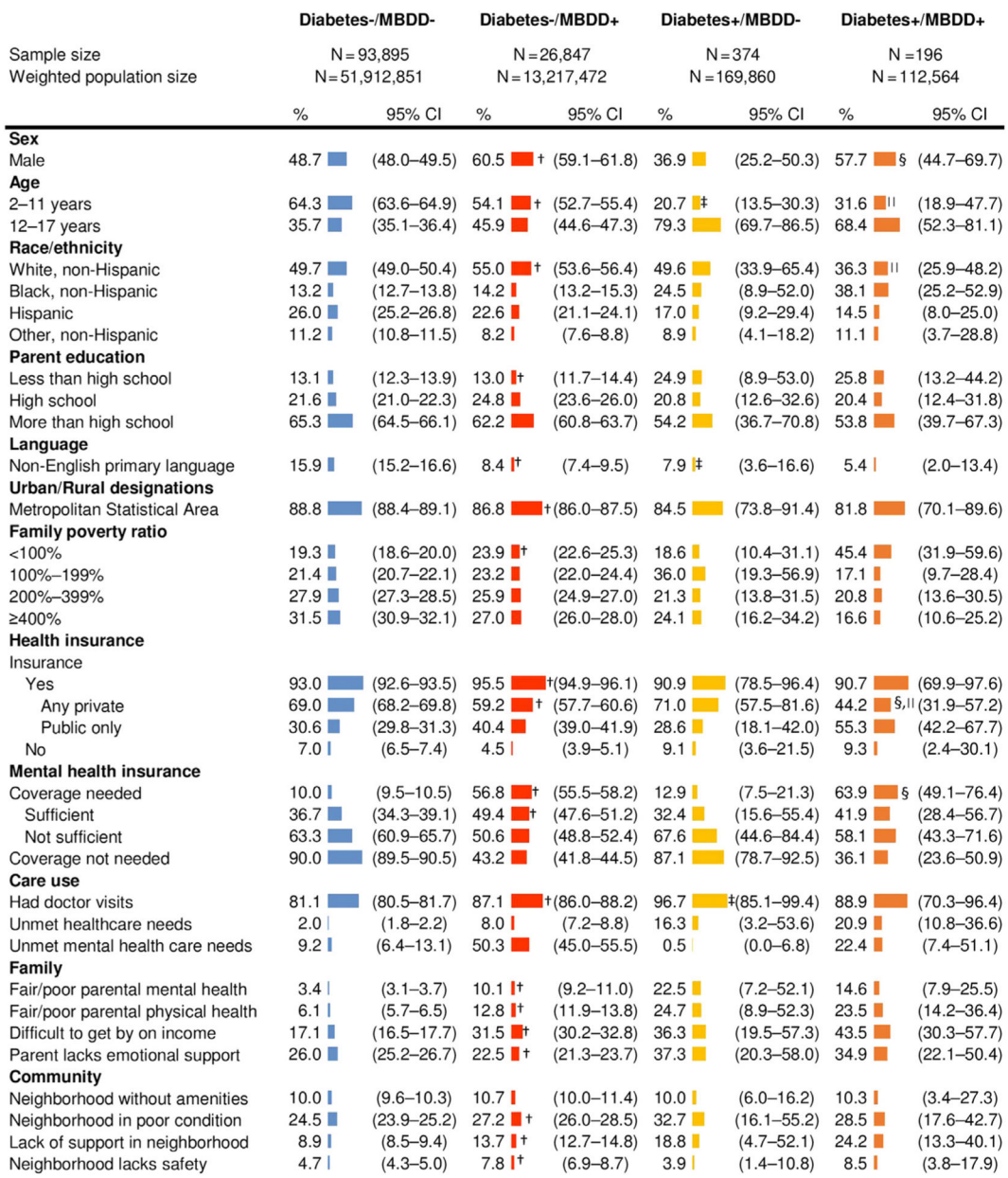

	Diabetes-/MBDD-		Diabetes-/MBDD+		Diabetes+/MBDD-		Diabetes+/MBDD+	
Sample size	N = 93,895		N = 26,847		N = 374		N = 196	
Weighted population size	N = 51,912,851		N = 13,217,472		N = 169,860		N = 112,564	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Sex								
Male	48.7	(48.0–49.5)	60.5 †	(59.1–61.8)	36.9	(25.2–50.3)	57.7 §	(44.7–69.7)
Age								
2–11 years	64.3	(63.6–64.9)	54.1 †	(52.7–55.4)	20.7 ‡	(13.5–30.3)	31.6 ‖	(18.9–47.7)
12–17 years	35.7	(35.1–36.4)	45.9	(44.6–47.3)	79.3	(69.7–86.5)	68.4	(52.3–81.1)
Race/ethnicity								
White, non-Hispanic	49.7	(49.0–50.4)	55.0 †	(53.6–56.4)	49.6	(33.9–65.4)	36.3 ‖	(25.9–48.2)
Black, non-Hispanic	13.2	(12.7–13.8)	14.2	(13.2–15.3)	24.5	(8.9–52.0)	38.1	(25.2–52.9)
Hispanic	26.0	(25.2–26.8)	22.6	(21.1–24.1)	17.0	(9.2–29.4)	14.5	(8.0–25.0)
Other, non-Hispanic	11.2	(10.8–11.5)	8.2	(7.6–8.8)	8.9	(4.1–18.2)	11.1	(3.7–28.8)
Parent education								
Less than high school	13.1	(12.3–13.9)	13.0 †	(11.7–14.4)	24.9	(8.9–53.0)	25.8	(13.2–44.2)
High school	21.6	(21.0–22.3)	24.8	(23.6–26.0)	20.8	(12.6–32.6)	20.4	(12.4–31.8)
More than high school	65.3	(64.5–66.1)	62.2	(60.8–63.7)	54.2	(36.7–70.8)	53.8	(39.7–67.3)
Language								
Non-English primary language	15.9	(15.2–16.6)	8.4 †	(7.4–9.5)	7.9 ‡	(3.6–16.6)	5.4	(2.0–13.4)
Urban/Rural designations								
Metropolitan Statistical Area	88.8	(88.4–89.1)	86.8 †	(86.0–87.5)	84.5	(73.8–91.4)	81.8	(70.1–89.6)
Family poverty ratio								
<100%	19.3	(18.6–20.0)	23.9 †	(22.6–25.3)	18.6	(10.4–31.1)	45.4	(31.9–59.6)
100%–199%	21.4	(20.7–22.1)	23.2	(22.0–24.4)	36.0	(19.3–56.9)	17.1	(9.7–28.4)
200%–399%	27.9	(27.3–28.5)	25.9	(24.9–27.0)	21.3	(13.8–31.5)	20.8	(13.6–30.5)
≥400%	31.5	(30.9–32.1)	27.0	(26.0–28.0)	24.1	(16.2–34.2)	16.6	(10.6–25.2)
Health insurance								
Insurance								
Yes	93.0	(92.6–93.5)	95.5 †	(94.9–96.1)	90.9	(78.5–96.4)	90.7	(69.9–97.6)
Any private	69.0	(68.2–69.8)	59.2 †	(57.7–60.6)	71.0	(57.5–81.6)	44.2 §,‖	(31.9–57.2)
Public only	30.6	(29.8–31.3)	40.4	(39.0–41.9)	28.6	(18.1–42.0)	55.3	(42.2–67.7)
No	7.0	(6.5–7.4)	4.5	(3.9–5.1)	9.1	(3.6–21.5)	9.3	(2.4–30.1)
Mental health insurance								
Coverage needed	10.0	(9.5–10.5)	56.8 †	(55.5–58.2)	12.9	(7.5–21.3)	63.9 §	(49.1–76.4)
Sufficient	36.7	(34.3–39.1)	49.4 †	(47.6–51.2)	32.4	(15.6–55.4)	41.9	(28.4–56.7)
Not sufficient	63.3	(60.9–65.7)	50.6	(48.8–52.4)	67.6	(44.6–84.4)	58.1	(43.3–71.6)
Coverage not needed	90.0	(89.5–90.5)	43.2	(41.8–44.5)	87.1	(78.7–92.5)	36.1	(23.6–50.9)
Care use								
Had doctor visits	81.1	(80.5–81.7)	87.1 †	(86.0–88.2)	96.7 ‡	(85.1–99.4)	88.9	(70.3–96.4)
Unmet healthcare needs	2.0	(1.8–2.2)	8.0	(7.2–8.8)	16.3	(3.2–53.6)	20.9	(10.8–36.6)
Unmet mental health care needs	9.2	(6.4–13.1)	50.3	(45.0–55.5)	0.5	(0.0–6.8)	22.4	(7.4–51.1)
Family								
Fair/poor parental mental health	3.4	(3.1–3.7)	10.1 †	(9.2–11.0)	22.5	(7.2–52.1)	14.6	(7.9–25.5)
Fair/poor parental physical health	6.1	(5.7–6.5)	12.8 †	(11.9–13.8)	24.7	(8.9–52.3)	23.5	(14.2–36.4)
Difficult to get by on income	17.1	(16.5–17.7)	31.5 †	(30.2–32.8)	36.3	(19.5–57.3)	43.5	(30.3–57.7)
Parent lacks emotional support	26.0	(25.2–26.7)	22.5 †	(21.3–23.7)	37.3	(20.3–58.0)	34.9	(22.1–50.4)
Community								
Neighborhood without amenities	10.0	(9.6–10.3)	10.7	(10.0–11.4)	10.0	(6.0–16.2)	10.3	(3.4–27.3)
Neighborhood in poor condition	24.5	(23.9–25.2)	27.2 †	(26.0–28.5)	32.7	(16.1–55.2)	28.5	(17.6–42.7)
Lack of support in neighborhood	8.9	(8.5–9.4)	13.7 †	(12.7–14.8)	18.8	(4.7–52.1)	24.2	(13.3–40.1)
Neighborhood lacks safety	4.7	(4.3–5.0)	7.8 †	(6.9–8.7)	3.9	(1.4–10.8)	8.5	(3.8–17.9)

Figure 1.

Demographic, health care, family, and community factors in children and adolescents (2–17 years) with or without diabetes and mental, behavioral, or developmental disorders*. Column percentages are presented numerically and as bars. *Mental, behavioral, and developmental disorders (MBDD) include any current parent-reported diagnosis of attention-deficit/hyperactivity disorder, anxiety, depression, disruptive behavior disorders, Tourette syndrome, autism spectrum disorder, intellectual disability, developmental delay, learning disability, or speech/language disorder. †Significant mental, behavioral, and developmental disorder association between groups without diabetes, chi-square $P <$ .05. ‡Significant diabetes association between groups without mental, behavioral, and developmental disorders, chi-square $P <$ .05. §Significant mental, behavioral, and

developmental disorder association between groups with diabetes, chi-square $P < .05$. || Significant diabetes association between groups with mental, behavioral, and developmental disorders, chi-square $P < .05$.

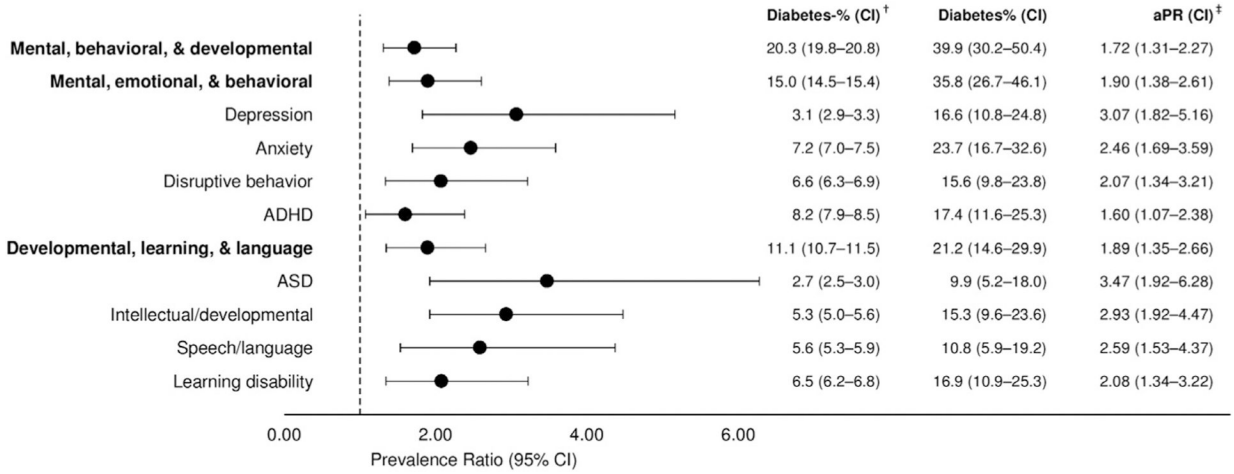

Figure 2.

Prevalence of mental, behavioral, and developmental disorders* among children and adolescents (2–17 years) with and without diabetes, National Survey of Children's Health, 2016–2019. *Mental, behavioral, and developmental disorders reported here include parent-reported current diagnosis of any of the following mental, emotional, and behavioral disorders: depression, anxiety, disruptive behavior disorders, ADHD, and Tourette syndrome, and the following developmental, learning, and language disorders: intellectual disability, developmental delay, speech/language disorder, and learning disability. †Crude, weighted prevalence estimates of mental, behavioral, and developmental disorders are shown by diabetes status. ‡aPRs are adjusted by age, sex, and race/ethnicity.

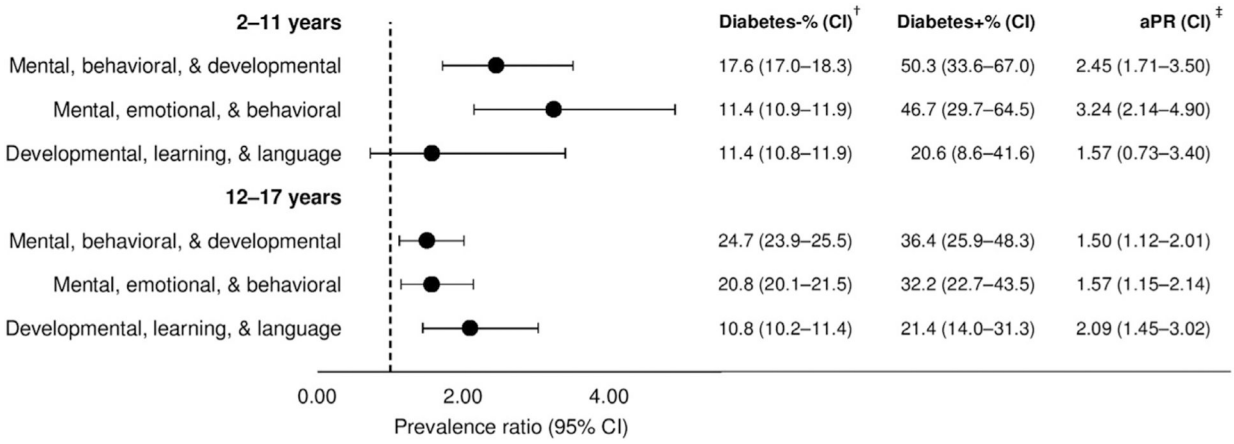

Figure 3.

Prevalence of mental, behavioral, and developmental disorders* among younger children 2–11 and adolescents 12–17 years with and without diabetes, National Survey of Children's Health, 2016–2019. *Mental, behavioral, and developmental disorders reported here include parent-reported current diagnosis of any of the following mental, emotional, and behavioral disorders: depression, anxiety, disruptive behavior disorders, attention-deficit/hyperactivity disorder, and Tourette syndrome, and the following developmental, learning, and language disorders: autism spectrum disorder, intellectual disability, developmental delay, speech/language disorder, and learning disability. †Crude, weighted prevalence estimates of mental, behavioral, and developmental disorders are shown by diabetes status. ‡aPRs are adjusted by age, sex, and race/ethnicity.

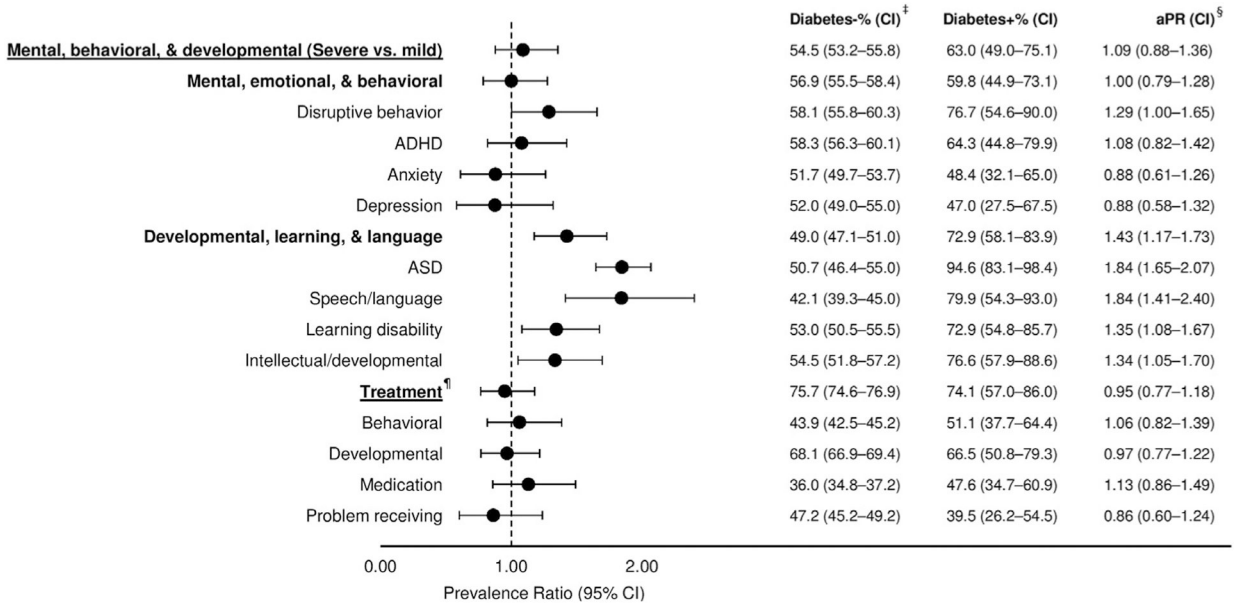

Figure 4.

Perceived* severity and treatment of mental, behavioral, and developmental disorders† in children and adolescents (2–17 years) with or without diabetes, National Survey of Children's Health, 2016–2019. *Parents reported severity of individual mental, behavioral, or developmental disorders as mild, moderate, or severe. Both moderate and severe responses are grouped into the severe category. Only children with a given mental, behavioral, or developmental disorder are included within each analysis. †Mental, behavioral, and developmental disorders reported here include parent-reported current diagnosis of any of the following mental, emotional, and behavioral disorders: depression, anxiety, disruptive behavior disorders, ADHD, and Tourette syndrome, and the following developmental, learning, and language disorders: ASD, intellectual disability, developmental delay, speech/language disorder, and learning disability. ‡Crude, weighted prevalence estimates of mental, behavioral, and developmental disorders are shown by diabetes status. §aPRs are adjusted by age, sex, and race/ethnicity. ¶Child received any behavioral treatment, developmental services, or mental health medication in the last 12 months.