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Mental health impairment among children with atopic dermatitis: a U.S. population-based cross-sectional study of the 2013-2017 National Health Interview Survey

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Abstract

Background: Atopic dermatitis (AD) is associated with mental health *disorders* but its impact on global mental health *symptoms* is less clear.

Objective: To determine the association between pediatric AD and mental health impairment

Methods: In a cross-sectional study using 2013-2017 U.S. National Health Interview Survey data, children with and without AD were assessed for mental disorder with impairment (MDI) using a validated behavioral screening questionnaire. Mental health services utilization was also reported.

Results: The prevalence of any MDI was 26.7% (95% CI 25.1-28.3) among children with AD and 17.7% (95% CI 17.2-18.2) among those without AD, with severe MDI being present in 10.9% (95% CI 9.9-12.1) and 6.2% (95% CI 5.9-6.5), respectively. Adjusted for sociodemographic factors, AD was associated with higher odds of MDI (OR 1.52, 95% CI 1.39-1.67) including impairments in conduct, emotions, peer relationships, and attention. Among children with AD, 19.9% (95% CI 16.6-23.8) and 53.5% (95% CI 48.5-58.5) of those with mild or severe MDI, respectively, had seen a mental health professional in the last year.

Limitations: Misclassification bias may arise from self-reported data.

Conclusion: AD is associated with clinically significant mental health symptoms but many affected children may not seek or receive care for their symptoms.

Capsule summary

- Pediatric atopic dermatitis is significantly associated with *symptoms* of impaired mental health spanning multiple areas including emotions, conduct, attention, and peer relationships.
- Nearly half of children with atopic dermatitis and severe mental health impairments may not receive mental health care, suggesting a critical practice gap.

Key words: anxiety, attention, atopic dermatitis, conduct, depression, eczema, emotion, health care utilization, mental health, psychiatry, psychology, relationships

Introduction

Atopic dermatitis (AD) affects up to 20% of children and impacts physical, emotional, and social functioning.¹⁻⁵ It has been linked to anxiety, depression, suicidal ideation, and attention deficit hyperactivity disorder (ADHD).⁶⁻¹¹ In a previous study of U.S. children, AD was associated with higher prevalence of anxiety, depression, ADHD, conduct disorder, and autism independent of sociodemographic characteristics and concomitant asthma.⁹

While these studies suggest that AD increases the risk for specific mental health *disorders*, less is known about its impact on global mental health *symptoms*. Since children with impaired mental health may not present to medical attention, studies that primarily assess clinical diagnoses may not fully capture the mental health burdens due to AD. Previous studies in Europe and Japan have found greater odds of mental health impairment among children with AD.¹²⁻¹⁵ However, these outcomes have not been investigated in the U.S. Additionally, while children with AD are more likely than those without AD to see healthcare providers including mental health specialists,^{9,16} there is limited information on healthcare utilization by children with concomitant AD and impaired mental health. Thus, we sought to determine the impact of AD on mental health symptoms in a U.S. pediatric population and to examine the utilization of health and social services among children with AD and mental health impairment.

Methods

We conducted a cross-sectional study using data from the 2013-2017 National Health Interview Survey (NHIS). The NHIS is a continuously enrolling survey administered to a representative sample of U.S. households and is used to monitor the health status of the U.S. population.^{17,18} For each household in the NHIS that includes children, one child is randomly selected, and detailed information is collected about their health from an adult caregiver.

In this study, we included children surveyed in the NHIS between 1/1/2013 and 12/31/2017. All were 4 to 17 years old, as younger children were not assessed for mental health

symptoms. The exposure was recent AD, which was asked of the child's caregiver using the question "During the past 12 months, has [the child] had eczema or any kind of skin allergy?" The child's caregiver also completed a short version of the Strengths and Difficulties Questionnaire (SDQ), a validated behavioral screening questionnaire that assesses mental health symptoms.^{19,20} The short SDQ evaluates several domains including conduct problems, emotional symptoms, peer relationships, and hyperactivity/inattention, as well as the impact of these symptoms. Previously validated cut-points were then applied to the SDQ scores to identify children with clinically significant mental health impairments, i.e. "mental disorder with impairment" (MDI), with more extreme cut-points indicating severe MDI.²¹ The definition of MDI was originally derived from the Child/Adolescent or Preschool Age Psychiatric Assessments, which are standardized instruments based on the *Diagnostic and Statistical Manual of Mental Disorders* (DSM)-IV to assess anxiety disorders, mood disorders, ADHD, oppositional defiant disorder, and conduct disorder as well as the level of impaired functioning related to them; MDI indicated the presence of any disorder with at least one partial or severe impairment rating, and severe MDI indicated the presence of any disorder with one or more severe impairment rating.²¹ The primary study outcome of interest was MDI, categorized ordinally as none, mild, and severe. As secondary outcomes, we also examined individual domains of the SDQ, each measured ordinally as not true, somewhat true, and certainly true for symptoms and no, minor, definite, or severe difficulties for the overall impact of symptoms. Finally, we compared the self-reported utilization rates of health and social services in the last 12 months among children with AD who have no, mild, or severe MDI.

Ordinal logistic regression was performed to compare the odds of outcome categories between the AD and non-AD groups, adjusted for potential sociodemographic confounders determined *a priori* including sex, age, race/ethnicity, geographical region, household income, parental education, family structure, insurance coverage, and general health status. As AD can co-occur with other atopic and neurodevelopmental disorders which may contribute to mental

health impairment, we also adjusted for these comorbidities in additional multivariable models. Data were weight-adjusted to account for the NHIS sampling design and obtain population estimates. Statistical analysis was performed using Stata 14.2.

Results

A weighted total of 6,807,687 (11.8%) of 57,726,856 children reported AD in the last 12 months. Children with recent AD were more likely to be non-Hispanic or black, have parents with higher educational attainment, and live in single-mother households (Table I). Asthma, hayfever, respiratory allergy, ADHD, and autism were more common in the AD group. Children with AD also had poorer general health status by caregiver report (Table I).

The prevalence of any MDI among children with recent AD was 26.7% (95% CI 25.1-28.3) compared to 17.7% (95% CI 17.2-18.2) among children without recent AD ($p<0.001$) (Table II). Severe MDI was nearly twice as common in children with AD than those without (10.9% [95% CI 9.9-12.1] vs. 6.2% [95% CI 5.9-6.5]; $p<0.001$). In the primary model adjusted for sociodemographic factors, the adjusted odds ratio (aOR) of MDI was 1.52 (95% CI 1.39-1.67) among children with recent AD (Table II). Other statistically significant predictors of MDI included male sex, younger age, non-Hispanic ethnicity, white race, lower household income, single-mother or neither-parent households, worse general health status, and having insurance (data not shown). Region was not a statistically significant covariate, and its exclusion from the multivariable model did not change the results. Across the SDQ subdomains, children with recent AD were significantly more likely to misbehave (aOR 1.20 [95% CI 1.10-1.31]), worry often (aOR 1.64 [95% CI 1.51-1.79]), be unhappy (aOR 1.41 [95% CI 1.26-1.57]), get along better with adults than peers (aOR 1.20 [95% CI 1.10-1.30]), and have poor attention (aOR 1.34 [95% CI 1.24-1.43]) (Table II). Greater degrees of difficulty in these subdomains were also reported by children with AD (aOR 1.68 [95% CI 1.54-1.84]).

In multivariable models additionally adjusted for comorbid asthma, hayfever/respiratory allergy, ADHD, and autism, AD remained associated with MDI (aOR 1.28 [95% CI 1.14-1.44]) but its effect was attenuated compared to the primary model (Table II). Other statistically significant predictors in this model included younger age, non-Hispanic ethnicity, white race, lower household income, single-mother or neither-parent households, worse general health status, and having hayfever/respiratory allergy, ADHD, or autism (data not shown). Similar patterns were also observed for the individual SDQ subscale outcomes (Table II). No significant interactions between AD and other atopic illnesses were observed. In the absence of other atopy, AD was associated with 52% greater odds of MDI (aOR 1.52 [95% CI 1.33-1.73]) after adjustment for sociodemographic factors. In the absence of ADHD or autism, AD was associated with 46% greater adjusted odds of MDI (aOR 1.46 [95% CI 1.31-1.62] and 1.46 [95% CI 1.31-1.63], respectively).

Children with recent AD were more likely to have seen a mental health professional in the last year compared to children without AD (13.3% vs 8.3%, respectively; $p < 0.001$). Among children with AD, 19.9% (95% CI 16.6-23.8) of those with mild MDI had seen a mental health professional while 53.5% (95% CI 48.5-58.5) of those with severe MDI had done so (Table III). Children with AD were also more likely to have seen a medical specialist or general physician compared to children without AD (Table III). Eighty-eight percent of children with AD had visited a general doctor in the last 12 months; among those who had, 44.5% (95% CI 38.9-50.2) of children with severe MDI and 16.9% (95% CI 13.5-21.0) of children with mild MDI had reported doing so for an emotional or behavioral problem. Special education or Early Intervention services were more commonly received by children with AD than children without AD (13.4% vs 8.8%, respectively; $p < 0.001$), particularly by those with both AD and MDI. Among children with AD receiving educational or social services, 62.4% (95% CI 54.2-69.9) of those with severe MDI and 37.4% (95% CI 28.0-47.2) of those with mild MDI were receiving them for an emotional or behavioral issue (Table III).

Discussion

Our results indicate that mental health disturbances are common in children with AD. The excess risk of mental health impairment in the U.S. population attributable to AD (i.e. the population attributable risk) is 11 per 1,000 children. Our findings also suggest that AD is independently associated with clinically significant mental health symptoms. Compared to children without AD, children with recent AD had greater odds of any mental health impairment independent of sociodemographic factors, overall health status, and comorbid atopic and neurodevelopmental disorders. Although the mechanistic connections between AD and impaired mental health are not well understood, it has been thought that symptoms of AD, such as sleep disturbance and chronic itch, may mediate this relationship.^{5,22-24} Another proposed mechanism has been shared inflammatory processes and dysregulation of the hypothalamic-pituitary-adrenal axis leading to concurrent AD and neuropsychiatric symptoms.²⁵⁻²⁷

Our study is an important addition to the existing literature as it evaluates the association between AD and mental health symptoms among children in the U.S. using a population-based approach. Our results are consistent with those from previous studies in Europe and Japan which found similar associations between AD and mental health as assessed using a longer version of the SDQ. In a cross-sectional survey of young Norwegian adults, current AD was associated with 72% greater odds of mental health problems, adjusted for ethnicity, family income, and gender.¹² In a cross-sectional study of Japanese schoolchildren, mild or moderate AD was associated with 51% greater adjusted odds and severe AD with 163% greater odds of a clinically abnormal SDQ score.¹⁵ Similar to our findings, they also found that AD was significantly associated with impairments across all SDQ subdomains. In contrast, a study of Danish children found that AD was significantly associated with pathologic scores only for hyperactivity and marginally for emotion.¹³ Finally, in the only cohort study to date, German children with infantile-onset AD had 48% higher adjusted odds of mental health problems at age

10 compared to those without AD.¹⁴ Children with active AD at age 10 had even greater (150% higher) odds of mental health problems. Taken together, ours and previous findings indicate that AD imposes significant mental health burdens on children across diverse populations.

Unlike previous studies, we also evaluated the impact of several comorbid disorders on the relationship between AD and mental health. The effect of AD on MDI was attenuated after adjustment for asthma, hayfever/respiratory allergy, ADHD, and autism, suggesting that these comorbidities confound the association between AD and mental health outcomes. These findings are not unexpected, as previous studies have shown asthma, hayfever, and autism to be associated with mental health disturbances.^{13,28-34} Given the presence of a hyperactivity/inattention domain in the SDQ, we also expected that ADHD would be associated with the outcomes in this study. Within the subgroup of children without ADHD, only 6% of children with AD had severe mental health impairment in contrast to 11% among all children with AD; this suggests that ADHD accounts for a large proportion of the severe mental health symptoms detected. Nevertheless, even in the absence of other atopic illness, ADHD, or autism, AD remained independently associated with ~50% greater odds of mental health impairment.

Our study also suggests that utilization of health and social services by children with AD and impaired mental health is low relative to the degree of impairment identified. Although children with severe mental health symptoms utilized more services than those with mild or no symptoms, 47% of them had not seen a mental health professional in the last year. Similarly, although 88% of children with severe symptoms had seen a general doctor in the last year, only 45% had done so for emotional or behavioral issues. These findings suggest that children with mental health symptoms, even when severe, may not present to care. While the reasons for such cannot be determined from this study, one possible factor may be an under-recognition of the mental health burden of AD. However, even children without AD who had severe MDI reported low rates of mental health care, suggesting that these gaps in care may be pervasive

and not specific to children with AD. Poor access to providers or lack of mental health awareness by families may be potential reasons, among many others, for the underutilization of mental health services. Nevertheless, our findings support the notion that studies only focusing on diagnoses of clinical psychological disorders or patients actively seeking medical care may underestimate the full mental health impact of pediatric AD. Our results may also explain why a recent study observed no association between AD and hospitalization for mental health disorders in children, despite finding a strong association in adults and also higher rates of mental health diagnoses in children with AD.³⁵

Strengths of our study include its population-based design, adjustment for socioeconomic factors, and evaluation of multiple comorbid disorders. The use of a validated psychometric instrument such as the SDQ enabled us to assess a spectrum of mental health symptoms and to screen individuals for meaningful impairments in an unbiased manner. The SDQ has also been validated in clinical settings and can predict the presence of a psychiatric disorder over time.³⁶ However, there are several limitations to note. First, the study design was cross-sectional, which precludes any conclusions about the directionality of association between AD and mental health impairment. Second, AD was assessed using a caregiver's report based on a single question. However, this method has 87% positive predictive value, 96% specificity, and 70% sensitivity when compared to physician diagnosis of AD,³⁷ helping to ensure that the AD group in our study truly has AD. Moreover, the 11.8% population prevalence of AD in our study is consistent with previous estimates.^{1,3,9} Third, the short SDQ is a screening tool with high negative predictive value (88-95%) but only modest positive predictive value (51-73%);²¹ thus, the prevalence of MDI estimated from the SDQ is likely higher than its true prevalence, but we would expect this to affect both the AD and non-AD groups. The false-positive cases of MDI may also partly explain the underutilization of mental health services observed in this study, however they do not account for the gaps entirely. Moreover, the SDQ uses caregiver-reported data and does not capture all mental health symptoms affected by AD. Finally, as the NHIS did

not collect data on AD severity or treatments, we were unable to examine their impact on mental health outcomes.

In summary, mental health impairments are common among children with AD in the U.S. It is essential for clinicians and caregivers to recognize the mental health impact of AD so that children are appropriately screened and referred for care. As some of these impairments may relate to symptoms of ADHD, providers should consider evaluating specifically for inattention and hyperactivity in children with AD. Importantly, our findings that many children with impaired mental health may not seek or receive medical attention for their symptoms exposes a critical practice gap. Further work is needed to understand the potential barriers to mental health care in the pediatric AD population and to determine if successful treatment of AD results in better mental health outcomes.

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Table I. Subject characteristics (weighted total N=57,726,856; unweighted total N=45,409)

Characteristic, weighted % (95% CI)	AD in past 12 months	No AD in past 12 months	p-value
	Weighted N = 6,807,687 (11.8%)	Weighted N = 50,919,169 (88.2%)	
Sex			
Male	48.6 (46.9-50.3)	51.3 (50.7-52.0)	0.004
Female	51.4 (49.7-53.1)	48.7 (48.0-49.3)	
Age, y, mean (95% CI)	10.08 (9.9-10.2)	10.56 (10.5-10.6)	<0.001
Ethnicity			
Non-Hispanic	80.3 (78.7-81.8)	75.1 (74.0-76.1)	<0.001
Hispanic	19.7 (18.2-21.3)	24.9 (23.9-26.0)	
Race			
White	66.6 (64.7-68.5)	75.2 (74.3-76.0)	<0.001
Black / African American	20.9 (19.3-22.6)	13.9 (13.2-14.5)	
American Indian / Alaskan Native	0.9 (0.6-1.3)	1.2 (1.0-1.5)	
Asian	5.3 (4.5-6.2)	5.4 (5.1-5.7)	
Multiracial	6.3 (5.5-7.1)	4.4 (4.1-4.7)	
Region			
Northeast	15.7 (14.1-17.4)	16.4 (15.5-17.4)	0.72
Midwest	22.5 (20.9-24.2)	22.4 (21.4-23.3)	
South	37.5 (35.4-39.6)	37.5 (36.2-38.8)	
West	24.4 (22.5-26.4)	23.7 (22.6-24.9)	
Total annual household income			
\$0–34,999	28.8 (27.1-30.5)	26.4 (25.6-27.1)	<0.001
\$35,000–74,999	25.6 (24.0-27.3)	26.3 (25.6-26.9)	
\$75,000-99,999	11.3 (10.2-12.4)	11.3 (10.9-11.8)	
≥ \$100,000	28.2 (26.4-30.1)	27.2 (26.4-28.1)	
Not reported / unknown	6.1 (5.3-7.0)	8.8 (8.4-9.2)	
Highest parental education			
Less than high school	6.8 (5.9-7.8)	9.8 (9.3-10.3)	<0.001
High school graduate / GED	15.9 (14.7-17.3)	18.0 (17.4-18.6)	
Some college, no degree	19.2 (17.9-20.5)	17.8 (17.2-18.4)	
Associate degree	16.0 (14.7-17.4)	13.9 (13.5-14.4)	
Bachelor degree	23.7 (22.1-25.3)	22.6 (22.0-23.2)	
Master, professional, or doctoral degree	18.5 (17.0-20.0)	17.9 (17.3-18.6)	
Parental presence in family			
Mother only	30.0 (28.4-31.6)	23.5 (22.9-24.2)	<0.001
Father only	2.9 (2.4-3.5)	4.2 (4.0-4.5)	
Both mother and father	64.5 (62.8-66.2)	68.8 (68.1-69.6)	
Neither mother nor father	2.6 (2.1-3.2)	3.4 (3.2-3.7)	
History of asthma	27.5 (26.0-29.2)	13.6 (13.2-14.1)	<0.001
History of hayfever in last 12 mon	19.7 (18.4-21.1)	8.1 (7.8-8.5)	<0.001
History of respiratory allergy in last 12 mon	24.6 (23.0-26.3)	9.9 (9.5-10.3)	<0.001
History of attention deficit hyperactivity disorder	13.3 (12.1-14.6)	9.4 (9.0-9.8)	<0.001
History of autism	4.0 (3.2-4.9)	2.3 (2.0-2.5)	<0.001
Has taken prescription medication for 3+ mon	27.0 (25.5-28.6)	13.2 (12.8-13.7)	<0.001
General health status			
Excellent	49.5 (47.6-51.2)	59.0 (58.3-59.8)	<0.001
Very good	28.2 (26.6-29.8)	25.4 (24.8-26.0)	
Good	18.3 (17.1-19.7)	14.0 (13.5-14.5)	
Fair	3.5 (2.8-4.2)	1.3 (1.2-1.5)	
Poor	0.6 (0.3-0.9)	0.23 (0.2-0.3)	
Has health insurance coverage	95.3 (94.4-96.0)	94.1 (93.8-94.5)	0.01

AD, atopic dermatitis; CI, confidence interval. Means, prevalence (%) and 95% CI are weighted. P-values are from chi-square test with Rao-Scott complex sample design adjustment [for categorical variables] or the survey analysis equivalent of a two-sample t-test [for continuous variables].

Data Source: NCHS, National Health Interview Survey, 2013-2017.

Table II. Mental disorder with impairment and Strengths and Difficulties Questionnaire (SDQ) subscale outcomes, by AD status

	AD in past 12 months	No AD in past 12 months	p-value	Ordinal logistic regression		
Outcome	Weighted % (95% CI)	Weighted % (95% CI)		Unadjusted OR (95% CI)	Model 1 ^a Adjusted OR (95% CI)	Model 2 ^b Adjusted OR (95% CI)
<i>Clinical outcomes derived from SDQ</i>						
Mental disorder with impairment, any	26.7 (25.1-28.3)	17.7 (17.2-18.2)	<0.001 ^c	1.71 (1.57-1.87)	1.52 (1.39-1.67)	1.28 (1.14-1.44)
Any impairment	15.8 (14.5-17.1)	11.5 (11.1-11.9)				
Mild impairment	10.9 (9.9-12.1)	6.2 (5.9-6.5)				
Severe impairment						
<i>SDQ subscales (corresponding domain)</i>						
Misbehaved (conduct problems)			<0.001	1.33 (1.22-1.45)	1.20 (1.10-1.31)	1.10 (0.98-1.22)
Not true	74.1 (72.5-75.6)	79.3 (78.8-79.8)				
Somewhat true	22.8 (21.3-24.4)	18.0 (17.5-18.5)				
Certainly true	3.1 (2.6-3.7)	2.7 (2.5-2.9)				
Often worries (emotional symptoms)			<0.001	1.68 (1.55-1.83)	1.64 (1.51-1.79)	1.46 (1.33-1.61)
Not true	67.0 (65.2-68.6)	77.3 (76.7-77.9)				
Somewhat true	24.3 (22.8-25.8)	17.2 (16.7-17.8)				
Certainly true	8.8 (7.8-9.8)	5.5 (5.2-5.8)				
Unhappy/depressed (emotional symptoms)			<0.001	1.50 (1.35-1.67)	1.41 (1.26-1.57)	1.24 (1.09-1.42)
Not true	84.7 (83.4-85.9)	89.4 (88.9-89.8)				
Somewhat true	12.0 (11.0, 13.1)	7.7 (7.4-8.1)				
Certainly true	3.3 (2.8-4.0)	2.9 (2.7-3.2)				
Gets along better with adults (peer relationships)			<0.001	1.22 (1.12-1.32)	1.20 (1.10-1.30)	1.08 (0.98-1.19)
Not true	65.5 (63.8-67.2)	69.8 (69.1-70.5)				
Somewhat true	22.2 (20.7-23.9)	20.0 (19.4-20.6)				
Certainly true	12.3 (11.1-13.4)	10.2 (9.8-10.6)				
Poor attention span (hyperactivity/inattention)			<0.001	1.43 (1.33-1.54)	1.34 (1.24-1.43)	1.23 (1.13-1.34)
Not true	54.9 (53.2-56.6)	63.3 (62.7-64.0)				
Somewhat true	30.1 (28.5-31.8)	26.0 (25.4-26.6)				
Certainly true	14.9 (13.7-16.3)	10.6 (10.2-11.1)				
Difficulties in emotions, concentration, behavior, or getting along with others (impact)			<0.001	1.86 (1.72-2.03)	1.68 (1.54-1.84)	1.46 (1.31-1.63)
No difficulties	69.5 (67.8-71.2)	80.9 (80.4-81.5)				
Minor difficulties	21.7 (20.3-23.2)	14.1 (13.6-14.6)				
Definite difficulties	6.4 (5.6-7.4)	3.8 (3.6-4.1)				
Severe difficulties	2.4 (1.9-3.0)	1.1 (1.0-1.3)				

AD, atopic dermatitis; CI, confidence interval; OR, odds ratio

Means, prevalence (%) and 95% CI are weighted. P-values are from chi-squared test with Rao-Scott complex sample design adjustment.

^a Model 1 is adjusted for sex, age, ethnicity, race, geographical region, total family income, parental education, parental family structure, insurance coverage, general health status^b Model 2 is adjusted for the same covariates in Model 1 *plus* asthma ever, recent hayfever or respiratory allergy, attention deficit hyperactivity disorder, and autism^c p<0.001 for any impairment versus no impairment; and for no, mild, versus severe impairment

Data Source: NCHS, National Health Interview Survey, 2013-2017.

Table III. Mental health, health care, and special educational service utilization by AD and MDI status

Type of service or health care encounter	Weighted % (95% CI)				
	No AD	AD in past 12 months			
		Overall	No MDI	Mild MDI	Severe MDI
Mental health professional (e.g. psychiatrist, psychologist, psych nurse, clinical social worker) in last 12 mon	8.3 (7.9-8.6)	13.3 (12.1-14.6)	5.9 (5.0-6.9)	19.9 (16.6-23.8)	53.5 (48.5-58.5)
Medical specialist in last 12 mon	13.2 (12.7-13.6)	23.4 (22.0-24.9)	21.8 (20.2-23.6)	24.5 (20.8-28.7)	32.2 (27.6-37.2)
General doctor in last 12 mon	82.1 (81.5-82.6)	87.6 (86.4-88.7)	87.5 (86.2-88.7)	87.6 (84.6-90.1)	88.4 (84.5-91.5)
If yes, was for emotional/behavioral issue	5.6 (5.3-6.0)	9.6 (8.5-10.8)	2.8 (2.1-3.6)	16.9 (13.5-21.0)	44.5 (38.9-50.2)
Special education / Early Intervention services currently	8.8 (8.4-9.2)	13.4 (12.2-14.7)	7.8 (6.8-8.9)	21.4 (17.6-25.7)	39.3 (34.0-44.9)
If yes, was for emotional/behavioral issue	36.1 (34.1-38.2)	35.0 (30.7-39.7)	13.5 (9.2-19.3)	37.1 (28.0-47.2)	62.4 (54.2-69.9)

AD, atopic dermatitis; CI, confidence interval; MDI, mental disorder with impairment

Weighted (unweighted) N = 6,734,126 (5,357) with AD; 50,014,935 (39,302) without AD

Data Source: NCHS, National Health Interview Survey, 2013-2017.