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"Your Child Should Not Return": Preschool Expulsion Among Children With Attention-Deficit/Hyperactivity Disorder as an Early Indicator of Later Risks

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Abstract

Objective: Young children with attention-deficit/hyperactivity disorder (ADHD) can have challenging behaviors putting them at risk for preschool expulsion and for adverse outcomes across child development, health, and education. We examined the association of preschool expulsion with ADHD symptoms, diagnosis, treatment, and functioning among children with ADHD.

Methods: Using the cross-sectional National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome on 2947 children aged 5 to 17 years ever diagnosed with ADHD, parents reported on preschool expulsion, ADHD symptoms, diagnosis, treatment, and functioning. Weighted analyses included calculations of estimated means, prevalence, and prevalence ratios.

Results: Preschool expulsion was experienced by 4.4% of children ever diagnosed with ADHD (girls: 1.5%; boys: 5.7%). Children with preschool expulsion had lower mean ages at first concern about ADHD symptoms, ADHD diagnosis, and initiation of ADHD medication and had higher prevalence of severe ADHD symptoms and other mental, behavioral, or developmental disorders. A history of preschool expulsion was associated with difficulties with overall school performance, organized activities, writing, handwriting, and the parent-child relationship, but not with math, reading, or peer or sibling relationships. Children with preschool expulsion more often received school supports, behavioral classroom management, peer intervention, and social skills training.

Conclusion: Among children ever diagnosed with ADHD, history of preschool expulsion was associated with more severe ADHD symptoms, other disorders, earlier diagnosis and medication

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initiation, and academic and social impairment. Health care providers can use preschool expulsion as an indicator of risk for children with ADHD and connect families to effective treatments.

Index terms:

attention-deficit/hyperactivity disorder; ADHD; preschool; expulsion; childcare; child; long-term outcome

Children who have challenging behavior, such as showing impulsive aggression, failing to listen to directions, or taking risks that cause danger, can be difficult to manage in early care and education settings.[1–4] To manage challenging behavior, educators may use exclusion, ranging from temporary suspension to permanent expulsion, particularly when faced with contributing factors such as job stress and larger class size.[1,2,5] In the United States, the overall rate of preschool expulsion has been estimated as 1 in 142 based on preschool data[6] and 1 in 500 based on parent report[7] and disproportionately affects boys and children of color,[8,9] with disparities affected by a range of education system factors including teacher training and support, uneven or biased discipline policies, and child and family factors such as poverty and adverse experiences.[4,10]

Exclusion as a disciplinary strategy is associated with a number of adverse outcomes across development, health, and education[8] and can make challenging behavior worse.[8,11] Expulsion of preschool age children is of particular concern[11]; expulsion rates are estimated as 3 times higher in preschool than in later grades.[6] When their child is expelled, families are often not provided with referrals to additional services or better placement options, leaving a service gap.[12] Possible long-term consequences of early expulsion include negative impacts on child mental health, educational, and criminal justice outcomes[8] and on family functioning, psychological distress, and poor parental mental health.[3,12,13] For working parents or other primary caregivers (hereafter referred to as parents), unstable childcare can cause stress and result in lost wages or even loss of employment, but logistical and financial impact of expulsion on families has not been closely studied.[13]

Children with attention-deficit/hyperactivity disorder (ADHD) are at higher risk for behavior that can lead to expulsion than their peers. ADHD is a neurodevelopmental disorder with childhood onset characterized by developmentally inappropriate levels of impulsivity, hyperactivity, and/or inattention and pervasive functional impairment. Young children with behavior problems are disproportionally likely to have ADHD.[14] Nearly 1 in 3 children with ADHD (approximately 2 million) received the diagnosis before age 6 years.[15] Diagnosis of ADHD at a young age is associated with having more severe ADHD symptoms[16] and with hyperactive and impulsive symptoms more so than inattentive symptoms.[17] Such challenging behaviors can lead to teachers using less effective types of discipline.[18]

ADHD puts children at risk for exclusionary school discipline[19] starting with the preschool years[10]; nationally representative data from 2016 showed that 2% of children with ADHD were permanently expelled from preschool compared with 0.1% of children without disabilities; in addition, 9.6% versus 0.9% were asked to be picked up early, and 13.6% versus 0.2% were suspended for at least 1 day, respectively. Expulsion risk can play a role in determining the child's ADHD treatment; health care providers reported using expulsion,

or risk thereof, as a reason for about half of the cases when initiating ADHD medication treatment for preschool age children.[20]

In summary, the association between ADHD and preschool expulsion risk is noted in the literature[10]; however, the prevalence of preschool expulsion among children ever diagnosed with ADHD, impact on families, and long-term consequences are not well understood. This study uses a large sample of children ever diagnosed with ADHD, the National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome (NS-DATA), to describe prevalence of and factors associated with preschool expulsion. NS-DATA was designed to assess ADHD symptoms, treatment, and development over time and thus allows for a description of developmental factors associated with prior preschool expulsion. We examined whether preschool expulsion identifies a subset of children with ADHD who experience additional risk for poor outcomes.

METHODS

Sample

The 2014 NS-DATA was conducted by the Centers for Disease Control and Prevention's (CDC's) National Center for Health Statistics, with support from CDC's National Center on Birth Defects and Developmental Disabilities.[21] NS-DATA was a follow-up to the 2011 to 2012 National Survey of Children's Health (NSCH), a cross-sectional, nationally representative, telephone survey of US households with children younger than 18 years. On average, NS-DATA was conducted 29 months after the 2011 to 2012 NSCH.[22] To be eligible for NS-DATA, parents had to report on the 2011 to 2012 NSCH that a health care provider had ever told them their child had ADHD or Tourette syndrome. NS-DATA included 2 parent survey modules, 1 about ADHD and 1 about Tourette syndrome; if the child had ever been diagnosed with both disorders, parents could complete both modules of NS-DATA. This study used the ADHD module of NS-DATA, which included detailed questions about ADHD symptoms, diagnosis, interventions and treatment, and child functioning when not on medication. The overall sample of children ever diagnosed with ADHD from NS-DATA was 2966; of these, 17 children with missing data on expulsion were excluded from the analysis, and 2 children younger than 5 years at the time of NS-DATA were also excluded because most outcome variables such as school functioning were not applicable because of the child's age, resulting in an analytical sample of 2947 children.

Measures

Demographic information was collected through the 2011 to 2012 NSCH and included child sex, race and ethnicity, highest level of education for up to 2 parents in the household, and family income relative to the federal poverty level; poverty level for respondents with missing data for income and/or household size was estimated using multiple imputation. On NS-DATA, parents were asked if their child was ever expelled or asked not to return to a childcare center, preschool, or school. Being asked not to return is defined as expulsion in this article.[4] No information was collected on preschool attendance; children who were not expelled in preschool may not have attended preschool. Parents then reported the grades in which the child was expelled, starting with childcare and preschool (hereafter referred to

collectively as “preschool”). Parents also reported severity of their child’s ADHD symptoms at their worst, age of first concerns about ADHD symptoms and behavior, and whether the child had ever been diagnosed with other mental, behavioral, and developmental disorders. Parents reported on ADHD symptoms and impairment in school performance and social relationships during the past 6 months when the child was not taking ADHD medication, using the Vanderbilt Parent Report Scale.[23] Parents reported on the child’s lifetime use of ADHD interventions and treatment, including ADHD medication, training, therapies, and school support, and how ADHD affected their own work and finances (Supplemental Digital Content 1, http://links.lww.com/JDBP/A455, for variable information).

Analysis

Analyses were weighted to account for the complex sample design and included calculations of estimated prevalences, prevalence ratios (PRs), and means (m). PRs were calculated using weighted bivariate Poisson regression with robust standard errors. All age variables were reported in whole years, rounded down to the most recent birthday. Variables with cell values < 5 were collapsed or not presented to avoid possible disclosure risk; due to small cell sizes, racial/ethnic groups were clustered as non-Hispanic Black, non-Hispanic White, and Hispanic or non-Hispanic of Other races (Hispanic/Other). Because children varied in age between 5 and 17 years at the time of NS-DATA, and parents’ ability to recall the preschool years may differ by child age, a preliminary analysis examined whether report of preschool expulsion was associated with current child age. This association was not significant. Responses of “don’t know” along with refusals were coded as missing; missing data were rare for all variables (<1% of observations), except for multiply imputed federal poverty level; therefore, complete case analyses were carried out. All analyses were performed using SAS callable SUDAAN (RTI International; Cary, NC) and Stata survey procedures (StataCorp; College Station, TX). Data were analyzed through the National Center of Health Statistics Research Data Center because grade level at first expulsion was not available in the public use dataset.

RESULTS

Demographic Characteristics and Preschool Expulsion

Overall, 4.4% of children ever diagnosed with ADHD experienced preschool expulsion (Table 1). Expulsion disproportionately affected boys (PR = 3.9). Regarding race or ethnicity, non-Hispanic White children had significantly higher prevalence of preschool expulsion compared with Hispanic/Other (PR = 3.1; 5.3% vs 1.7%, respectively). The prevalence estimate for non-Hispanic Black children (4.8%) was not significantly different from other groups but was unstable due to small cell sizes (relative standard error = 40%). Parental education level and family poverty level were not significantly associated with preschool expulsion (Table 1). The average age of children in the analytic sample was 13 years at the time of the survey (range 5–17 years; data not shown in table).

Development of ADHD Symptoms and Concerns

Preschool expulsion was associated with receiving an ADHD diagnosis at an earlier age (m = 5.5 vs 6.9 years; Table 2). The mean age when concerns about behavior, attention,

or performance were first noted was lower for children with preschool expulsion (2.9 years) than for children without preschool expulsion (5.3 years, $p < 0.01$; Table 2); first concerns about ADHD symptoms and behavior emerged by age 5 years for 90.9% of children expelled in preschool, compared with 54.4% of children not expelled (Table 3). When asked about specific concerns that preceded the ADHD diagnosis (Table 3), parents of children expelled in preschool more often reported early concerns about the child's behavior in school, such as not listening or being disruptive (95.5% vs 79.8%; PR = 1.2) and about the child's behavior with friends (72.8% vs 55.7%; PR = 1.3) compared with parents of children without preschool expulsion; differences for concerns about child's behavior at home were not statistically significant. When parents were asked to describe the severity of ADHD symptoms at their worst, children with preschool expulsion had a 1.5 times higher prevalence of severe rather than mild or moderate ADHD symptoms than children without preschool expulsion. Based on ADHD symptoms at the time of the survey, children with preschool expulsion had a significantly higher prevalence of combined hyperactive/impulsive and inattentive ADHD presentation than those without (35.9% vs 23.9%; PR = 1.5; Table 3).

Other Diagnoses

Children with preschool expulsion had higher prevalence of ever having other mental, behavioral, or developmental disorders than those without (83.3% vs 66.5%; PR = 1.3) and specifically disruptive behavior disorders (PR = 1.6) and emotional disorders (PR = 1.5). When examining specific emotional disorders, preschool expulsion was associated with higher prevalence of ever having obsessive-compulsive disorders (PR = 2.3) and anxiety (PR = 1.7; Table 3). The difference in prevalence of developmental, learning, or language disorder did not reach significance.

ADHD Treatment, Intervention, and Support

Children expelled in preschool on average started taking ADHD medication at a significantly younger age (m = 6.0 vs 7.6 years; Table 2). Regarding psychosocial and educational interventions and support for ADHD, children with preschool expulsion had higher prevalence of ever receiving school-based educational support compared with those not expelled (88.7% vs 78.8%, PR = 1.1). Children who were expelled also had higher prevalence of ever receiving classroom management (PR = 1.4), peer intervention (PR = 1.7), and social skills training (PR = 1.7) compared with children without preschool expulsion; the difference for parent training and cognitive behavioral therapy approached statistical significance (PR = 1.5, $p = 0.05$; PR = 1.6, $p = 0.07$, respectively, and Table 3).

Later Schooling and Functioning

Children with preschool expulsion had higher prevalence of problems with overall school performance (PR = 1.4; Table 3), writing (PR = 1.3), and handwriting (PR = 1.5). Compared with children without preschool expulsion, significantly more children with preschool expulsion had difficulties participating in organized activities (PR = 1.8) and with parental and caregiver relationships (PR = 1.7), but not with sibling or peer relationships.

Regarding the impact of the child's ADHD on family functioning at the time of the survey, parents of children with preschool expulsion more often reported that they had to reduce work hours because of their child's behavior (32.6% vs 19.0%, PR = 1.7), compared with parents of children without preschool expulsion.

DISCUSSION

In this sample of children ever diagnosed with ADHD, the rate of preschool expulsion, about 1 in 20 children (4.4%), was noticeably higher compared with overall population estimates of 1 in 142 (0.7%)[6] in preschool-drawn samples or 1 in 500 children as reported by parents in a nationally representative sample in 2016 (0.2%).[7] In addition to being significantly higher than overall population estimates for preschool expulsion, this retrospective estimate of preschool expulsion among children with ADHD was about twice the percentage of expulsion found among 3- to 5-year-old children diagnosed with ADHD on the 2016 NSCH (2.0%),[7] which is expected since the NSCH sample may not yet have completed preschool, and our sample included children who received their ADHD diagnosis after expulsion and at later ages.

Children with ADHD who were expelled in preschool tended to have more severe clinical characteristics of ADHD; on average they had earlier onset of ADHD symptoms, more severe ADHD symptoms, and earlier initiation of ADHD medication and more often had other mental, behavioral, or developmental disorders compared with children with ADHD without preschool expulsion. Preschool attendance may also have contributed to early concern and diagnosis, given that teachers may bring symptoms to the attention of parents. Later in school, children with ADHD with preschool expulsion also experienced more impairment in overall school performance and specific skills such as writing and handwriting compared with children with ADHD without preschool expulsion. Parents of children with ADHD with preschool expulsion more often reported early concerns about behavior in school and with friends and later problems participating in organized activities and with the parent-child relationship. The findings indicated that among children diagnosed with ADHD, a history of preschool expulsion may serve as a marker for more severe ADHD, increased presence of other disorders, and increased difficulties with functioning in structured settings.

Preschool expulsion was associated with some differences in ADHD treatments and supports. ADHD treatment recommendations state that young children should first receive behavior therapy in the form of parent training before medication is prescribed and that children ages 6 years and older should receive medication in combination with behavior therapy.[24,25] Medication should be cautiously used in young children because medications have limited effectiveness and increased risk of side effects compared with older children.[25] In our study, children who experienced preschool expulsion started medication treatment earlier on average and received more support and services in school, which aligns with having more severe forms of ADHD. The earlier initiation of ADHD medication among children with preschool expulsion may align with previous findings that health care providers consider risk for expulsion as a factor when they prescribe medication for young children.[20] Less than half of parents (41.5%) of children with a history of

preschool expulsion received parent training, pointing to gaps in receiving the recommended behavioral treatment.[25] Given recommendations to use medication cautiously for children younger than age 6 years and using behavior treatment first, using medication as a response to the behavioral symptoms that are associated with expulsion may be a concern.[24,25]

Children who experienced preschool expulsion were more often diagnosed with another mental, behavioral, or developmental disorder than those without preschool expulsion. Because children are usually expelled for disruptive behaviors in the classroom,[5,8] the association with disruptive behavior disorders was expected. However, our study of children with ADHD showed that those with preschool expulsion more often had ever been diagnosed with an anxiety disorder and/or obsessive-compulsive disorder compared with those who had not been expelled. Because there was no information about symptom onset for these other disorders, it is not possible to determine whether early emotional and behavioral symptoms of the other disorder contributed to children being expelled, whether the expulsion itself had a negative impact on the child's mental health and contributed to the likelihood of another mental disorder,[12] or whether there are other common causes of these conditions.

Not all factors related to child functioning that we examined were associated with preschool expulsion. Children with ADHD who had experienced preschool expulsion more often had difficulties with some specific school-related skills such as writing, handwriting, and participating in organized activities, but not with core studies such as reading and math relative to children with ADHD without preschool expulsion. These results may indicate problems with classroom behavior and performance skills rather than academic abilities. Early concerns with school behavior before ADHD diagnosis were common regardless of preschool expulsion; however, parents of expelled children reported this early concern significantly more (95.5%) than parents of children without expulsion (79.8%). Structured settings may create a mismatch between the child's maturity level and expectations for behavior and performance, leading to an earlier identification of ADHD symptoms.[26] It is possible that difficulties in the classroom and subsequent expulsion may have led to parents seeking a diagnosis and treatment.[20] Because ADHD generally requires impairment in multiple contexts, it is possible that a mismatch between teachers' expectations and behavior management skills and the child's behavior may have contributed to the expulsion and subsequent diagnosis.[5] Children with a history of preschool expulsion also had increased difficulties with friends early on, whereas later they had increased difficulties participating in organized activities, but not with siblings or peers, thus potentially indicating more difficulties in structured settings.

Our findings regarding the association of expulsion with demographic factors must be interpreted with caution, given that we studied children with an ADHD diagnosis, and it is unknown if those without expulsion attended preschool. Boys were more likely to be expelled than girls, a finding that has been well documented among the overall population.[6,8] It is unclear to what extent gender differences may be influenced by overall uneven or biased policies[4] or by differences in challenging behaviors, given that boys more often than girls present with hyperactive and impulsive symptoms.[17] The relation of expulsion to other demographic factors differed from previous studies and

may be affected by methodological differences. In our study of children ever diagnosed with ADHD, non-Hispanic Black children did not have higher prevalence of expulsion than non-Hispanic White children, in contrast to previous studies of general populations attending preschool.[6,8,9] However, the prevalence estimates for non-Hispanic Black children were not stable due to small sample size. In addition, socioeconomic factors such as poverty and education level were not associated with preschool expulsion, different from previous research of children identified with ADHD who attended preschool.[7] Our study included only children with a diagnosis of ADHD, and access to diagnosis is affected by socioeconomic factors. In addition, findings were potentially affected by differences in whether children attended preschool, which is also affected by socioeconomic factors.[27]

Limitations

The study had several additional limitations. First, the data were based on parent report and thus may be affected by recall. Children in the survey represented a large age range and parents of older children may have difficulty recalling the preschool age. Children without preschool expulsion may not have attended preschool, thus affecting the findings. Many of the outcome variables addressed child functioning at the time of the survey and may not be generalizable to child functioning in preschool. For example, children who had clinically significant inattentive symptoms at the time of the survey were not less likely to have been expelled than those with clinically significant hyperactive/impulsive or combined symptoms. However, symptoms often change over time,[28] and it is possible that children with preschool expulsion had more disruptive impulsive or hyperactive behavior early on. The relatively small sample size among some demographic groups also resulted in large confidence intervals for some estimates. Finally, the NS-DATA was a subsample of the 2011 to 2012 NSCH and did not include a comparison group of children never diagnosed with ADHD. Data were collected in 2014 and may not be generalizable to current populations.

Implications

The pattern of expulsion more often affecting children with ADHD with early concerns, severe symptoms, and other disorders indicate preschool expulsion as a marker for a more severe clinical presentation of ADHD. When developing treatment plans for children with ADHD, health care providers can use information that the child was expelled or otherwise excluded in preschool as an early warning sign that the child's behavioral needs for support in preschool may not be as easily met[4,11] and investigate early prevention and support services to prevent the detrimental impact of future exclusionary discipline and untreated socioemotional concerns on child development.[11] Treatment plans can include parent training in behavior management, which can be an effective treatment for young children with ADHD and is the recommended first line of treatment for preschoolers before medication is tried.[24,25] This recommendation also applies to children with complex ADHD, i.e., those who have other mental, behavioral, or developmental disorders,[24] which was present in 83.3% of children who had experienced preschool expulsion. Teacher-delivered behavioral classroom management is part of recommended treatment.[24,25] Preschool and school-based intervention and prevention may warrant a particular focus when developing treatment plans for ADHD.[25]

Behavior therapy is also effective in preventing behavior symptoms among children at risk for ADHD[29] and can help families when children have behavioral symptoms without having a diagnosis, including young preschoolers for whom a reliable diagnosis of ADHD may not be possible.[24] By including expulsion in a clinical assessment of the child's functioning, health care providers may identify children who may not meet diagnostic criteria for ADHD at the time but who could benefit from early intervention. Health care providers can communicate with educational programs and connect families to effective treatments and support.[11]

Children who experience exclusionary discipline may benefit from attending early childhood programs that focus on positive behavior interventions including training and support for teachers.[2,8,11,19] Early childhood program administrators can use interventions including early childhood mental health consultation aimed at preventing expulsion for preschoolers, which has shown promising effects for reducing problem behaviors including ADHD symptoms.[30] Such approaches are likely to assist teachers by improving their ability to manage children's behavior, by decreasing the disruption and risk the behavior may represent for other children, and by receiving the necessary support to cope with the associated caregiving stress that teachers experience when trying to manage challenging behaviors.[1,2,5] These interventions are also likely to lessen the economic impact of ADHD on families by improving parents' ability to get to work or school on time and to maintain productivity.[30]

Finally, policy efforts at state and national levels can disincentivize exclusionary discipline and support effective classroom management to reduce preschool expulsion.[11] State licensing standards and quality initiatives can offer guidance, support, and incentives for professional development for educators, strengthened parent-teacher relationships, integration of primary health care and special education resources, and effective management of challenging behaviors early on, so that teachers can support children's development without exclusion.[3,31]

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Prevalence of Preschool Expulsion Among Children Ever Diagnosed With ADHD by Selected Socio-Demographic Factors, NS-DATA 2014

	Expelled in Preschool[b]		
	% (95% CI)	PR (95% CI)	*p*-value
Overall[a]	4.4 (3.3–5.9)	—	—
Child characteristics			
Sex			
Male	5.7 (4.1–7.8)	3.9 (2.0–7.4)	<0.01
Female	1.5 (0.8–2.5)[c]	Referent	
Race/ethnicity			
Black, non-Hispanic	4.8 (2.1–11.0)[c]	2.9 (0.9–8.7)	0.06
Hispanic and non-Hispanic Other[d]	1.7 (0.8–3.5)[c]	Referent	
White, non-Hispanic	5.3 (3.8–7.3)	3.1 (1.4–7.0)	0.01
Household education level[e]			
High school or less	3.8 (2.0–7.1)[c]	0.8 (0.4–1.6)	0.55
More than high school	4.7 (3.4–6.5)	Referent	
Poverty level[f]			
<=200%	4.6 (2.9–7.3)	1.1 (0.6–2.0)	0.73
>200%	4.2 (2.9–6.0)	Referent	

ADHD, attention-deficit/hyperactivity disorder; CI, exact confidence interval; NS-DATA, National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome; PR, prevalence ratio of preschool expulsion by sociodemographic factors.

[a]The overall sample of children with ADHD ages 4 to 17 yr who had information on expulsion was 70.0% male; 14.9% Black, non-Hispanic, 22.5% Hispanic, 62.6% White, non-Hispanic; 65.6% household education level high school or less; 50.3% poverty level ≤ 200%.

[b]The analytic sample excluded 2 children who were of preschool age at the time of the survey (age 4 yr).

[c]The relative standard error for this estimate is between 30% and 40%; the estimate should be interpreted with caution.

[d]Children identified by the parent/caregiver as Hispanic, American Indian or Alaska Native, Asian, or "Other."

[e]Highest education level achieved by any adult in the home.

[f]Federal poverty level of the household, multiply imputed.

Table 2.

Mean Age at First Concern, ADHD Diagnosis, and ADHD Medication Initiation for Children With ADHD Who Were and Were Not Expelled From Preschool, NS-DATA 2014

	Mean Age in Years (95% CI)		
	Expelled in Preschool	Not Expelled in Preschool	p [a]
First concern[b]	2.9 (2.3–3.6)	5.3 (5.2–5.5)	<0.01
First ADHD diagnosis	5.5 (5.0–6.0)	6.9 (6.8–7.1)	<0.01
ADHD medication initiation	6.0 (5.4–6.6)	7.6 (7.4–7.8)	<0.01

ADHD, attention-deficit/hyperactivity disorder; CI = exact confidence interval; NS-DATA, National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome.

[a]Based on Wald tests of difference in means by expelled vs not expelled.

[b]Data file top-coded the maximum child age at first concern for ADHD at 13 yr or older (<1% of weighted sample), displayed mean may be lower than the actual mean of the reported data.

Table 3.

Prevalence of Developmental Health, Functioning, Other Mental, Behavioral, or Developmental Disorders and Intervention/Support Indicators by Preschool Expulsion Among Children With ADHD, NS-DATA 2014

	Expelled in Preschool			
	Yes	No		
	% (95% CI)	% (95% CI)	PR (95% CI)	*p*
Developmental health				
Early concerns, prior to ADHD diagnosis				
First concerns younger than 5 yr[a]	90.9 (76.9–96.7)	54.4 (51.3–57.8)	1.7 (1.5–1.9)	<0.01
Concerns about school behavior	95.5 (85.6–98.7)	79.8 (77.0–82.3)	1.2 (1.1–1.3)	<0.01
Concerns about home behavior	72.3 (56.9–83.8)	63.2 (60.0–66.3)	1.1 (0.9–1.4)	0.18
Concerns about behavior with friends	72.8 (56.6–84.6)	55.7 (52.4–58.9)	1.3 (1.1–1.6)	0.01
Concerns about grades, tests, assignments	61.1 (45.2–74.8)	74.5 (71.6–77.2)	0.8 (0.6–1.1)	0.11
Symptoms at their worst[b]				
Severe ADHD symptoms	73.0 (59.6–83.2)	47.5 (44.2–50.7)	1.5 (1.3–1.8)	<0.01
ADHD presentation[c]				
Combined	35.9 (22.9–51.4)	23.9 (21.1–26.9)	1.5 (1.0–2.1)	0.03
Hyperactive/impulsive	2.8 (1.7–6.7)[k]	4.5 (3.3–6.0)	0.6 (0.2–1.6)	0.33
Inattentive	29.4 (17.4–45.1)	27.7 (24.8–30.7)	1.1 (0.6–1.7)	0.81
Subthreshold	31.8 (19.7–47.0)	43.9 (40.7–47.2)	0.7 (0.5–1.1)	0.16
Other mental, behavioral, or developmental disorders				
Any MBDD[d]	83.3 (70.7–91.2)	66.5 (63.4–69.4)	1.3 (1.1–1.4)	<0.01
Disruptive behavior[e]	37.5 (24.3–52.8)	23.1 (20.4–26.1)	1.6 (1.1–2.4)	0.02
Emotional disorders[f]	57.2 (42.3–70.9)	37.1 (34.0–40.3)	1.5 (1.2–2.0)	<0.01
Anxiety	29.9 (17.7–45.9)	17.9 (15.6–20.5)	1.7 (1.02–2.8)	0.04
Depression	14.1 (6.8–27.1)[k]	19.6 (17.1–22.4)	0.7 (0.4–1.5)	0.40
OCD	32.1 (18.8–49.1)	13.8 (11.6–16.3)	2.3 (1.4–3.9)	<0.01
PTSD	11.4 (4.6–25.5)	7.0 (5.5–8.9)	1.6 (0.7–4.0)	0.28
Developmental, learning, or language disorders[g]	58.8 (43.7–72.3)	47.7 (44.4–50.9)	1.2 (0.9–1.6)	0.11

	Expelled in Preschool			
	Yes	No		
	% (95% CI)	% (95% CI)	PR (95% CI)	*p*
Intervention and support				
School-based support	88.7 (79.1–94.2)	78.8 (75.9–81.3)	1.1 (1.03–1.2)	0.01
Classroom management	80.3 (68.2–88.5)	57.3 (54.0–60.5)	1.4 (1.2–1.6)	<0.01
IEP or 504 plan	63.1 (47.4–76.4)	52.5 (49.2–55.7)	1.2 (0.9–1.5)	0.14
Peer intervention	47.4 (32.7–62.7)	27.7 (24.8–30.8)	1.7 (1.2–2.4)	<0.01
Social skills training	61.5 (46.5–74.7)	36.5 (33.4–39.7)	1.7 (1.3–2.2)	<0.01
Cognitive-behavioral therapy	29.1 (16.9–45.3)	17.9 (15.4–20.6)	1.6 (1.0–2.7)	0.07
Parent training	41.5 (27.8–56.6)	28.6 (25.8–31.7)	1.5 (1.0–2.1)	0.05
Impact on functioning				
Expulsion in later grades[h]	13.0 (6.3–24.9)[k]	11.8 (9.7–14.2)	1.1 (0.5–2.3)	0.75
School difficulties[i]				
Overall school performance	61.4 (46.8–74.2)	45.2 (41.9–48.5)	1.4 (1.1–1.7)	0.01
Writing	67.2 (52.7–79.1)	49.8 (46.5–53.1)	1.3 (1.1–1.7)	0.01
Reading	41.2 (27.1–57.0)	40.1 (36.9–43.3)	1.0 (0.7–1.5)	0.88
Math	45.6 (31.1–60.8)	44.0 (40.8–47.2)	1.0 (0.7–1.5)	0.84
Handwriting	60.0 (45.1–73.3)	40.5 (37.3–43.8)	1.5 (1.1–1.9)	<0.01
Organized activities[j]	51.1 (36.0–65.9)	28.5 (25.6–31.6)	1.8 (1.3–2.5)	<0.01
Social impact				
Parental relationships	36.5 (23.1–52.3)	21.2 (18.6–24.0)	1.7 (1.1–2.6)	0.01
Sibling relationships	39.4 (24.6–56.4)	30.3 (27.2–33.6)	1.3 (0.8–2.0)	0.23
Peer relationships	38.4 (24.9–54.0)	27.6 (24.8–30.7)	1.4 (0.9–2.1)	0.11
Work and financial impact				
Work stoppage	16.5 (9.2–27.8)[k]	13.8 (11.6–16.4)	1.2 (0.7–2.1)	0.55
Work reduction	32.6 (20.4–47.8)	19.0 (16.6–21.8)	1.7 (1.1–2.7)	0.02
Financial impact	26.7 (17.2–39.0)	20.8 (18.2–23.7)	1.3 (0.8–2.0)	0.26

ADHD, attention-deficit/hyperactivity disorder; IEP, individualized education program; MBDD, mental, behavioral, or developmental disorders; NS-DATA, National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome; OCD, obsessive-compulsive disorder; PTSD, post-traumatic stress disorder.

[a]Age at first concern younger than 5 yr.

[b] Severe versus mild/moderate ADHD symptoms at their worst.

[c] Combined: 6 or more hyperactive/impulsive and 6 or more inattentive symptoms. Hyperactive/impulsive: 6 or more hyperactive/impulsive symptoms but less than 6 inattentive symptoms. Inattentive: 6 or more hyperactive/impulsive symptoms but less than 6 hyperactive/impulsive symptoms. Subthreshold: less than 6 symptoms on both scales. Symptoms reported for the 6-month period before the survey.

[d] Child ever received a diagnosis of conduct disorder, oppositional defiant disorder, autism spectrum disorder, intellectual disability, learning disorder, language disorder, OCD, PTSD, anxiety, bipolar disorder, and/or depression.

[e] Child ever received a diagnosis of conduct disorder and/or oppositional defiant disorder.

[f] Child ever received a diagnosis of OCD, PTSD, anxiety, bipolar disorder, and/or depression.

[g] Childreceived a diagnosis of autism spectrum disorder, intellectual disability, learning disorder, and language disorder.

[h] Child was also expelled in grades K-12.

[i] Based on child's behavior when not taking medication for ADHD or other difficulties with emotions, behavior, or concentration.

[j] Includes only children who participated in organized activities (95% of unweighted sample).

[k] The relative standard error for this estimate is between 30% and 40%; estimate should be interpreted with caution.