Longitudinal Trends in the Diagnosis of Attention-Deficit/Hyperactivity Disorder and Stimulant Use in Preschool Children on Medicaid

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Objectives To describe trends in the diagnosis of attention-deficit/hyperactivity disorder (ADHD) and prescribing of stimulants in preschool-age children receiving Medicaid and to identify factors associated with the receipt of psychosocial care.

Study design Data were extracted from 2012-2016 Kentucky Medicaid claims for children aged <6 years. ADHD was identified using *International Classification of Diseases, Tenth Revision* codes F90.0, F90.1, F90.2, F90.8, and F90.9. Psychosocial therapy was defined as having at least 1 relevant Current Procedural Terminology code in a claim within the year. A generalized linear model with a logit link and binomial distribution was used to assess factors associated with receipt of psychosocial treatment in 2016.

Results More than 2500 (1.24%) preschool-aged children receiving Medicaid had a diagnosis of ADHD in 2016, with 988 (38.2%) of those receiving a stimulant medication. Children in foster care were diagnosed with and/or treated for ADHD 4 times more often than other Medicaid recipients. Of the 1091 preschoolers receiving stimulants, 99 (9%) did not have a diagnosis of ADHD. There were no significant differences in diagnoses by race/ethnicity, but children reported to be black, Hispanic, or other race/ethnicity received stimulants at a lower rate than white children. Positive predictors for receiving psychosocial therapy in 2016 included having the diagnosis but not receiving a stimulant, having at least 1 prescription written by a psychiatrist, having comorbidities, and age. The use of stimulants in children aged <6 years declined from 0.9% in 2012 to 0.5% in 2016.

Conclusions Promising trends demonstrate a decreasing use of stimulants in preschoolers; however, continued vigilance is needed to promote the optimal use of psychosocial interventions. *(J Pediatr 2019;207:185-91).*

The diagnosis and treatment of attention-deficit/hyperactivity disorder (ADHD) in preschoolers remains controversial. A developmental perspective is critical when evaluating inattention and hyperactivity in a child aged <6 years. Nonetheless, research has demonstrated that ADHD can be reliably diagnosed in children as young as 3 years after a thorough evaluation.[1] Perhaps even more controversial is the treatment of ADHD in preschoolers with stimulant medication. The Preschool ADHD Treatment Study has evaluated the safety and efficacy of medication use in preschoolers diagnosed with ADHD.[1] This 6-site study, published in 2009, assessed the use of methylphenidate in 3- to 5-year-old children with ADHD and demonstrated significant benefit from 3 daily doses of methylphenidate compared with placebo, but did not report complete remission of symptoms.[1] Of note were findings that younger children tended to have more severe symptoms of ADHD and up to 70% had comorbid conditions. Preschoolers were also more likely to have side effects with medication use and more likely to discontinue medication because of intolerance.[1]

The American Academy of Pediatrics published revised clinical practice guidelines for the diagnosis, evaluation, and treatment of ADHD in 2011.[2] A specific recommendation for preschool-aged children (aged 4-5 years) was the use of evidence-based parent- and/or teacher-administered behavior therapy as first-line

ADHD	Attention-deficit/hyperactivity disorder
CPT	Current Procedural Terminology
ICD-9	*International Classification of Diseases, Ninth Revision*
ICD-10	*International Classification of Diseases, Tenth Revision*
MCO	Managed care organization
RUCC	Rural-Urban Continuum Code

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treatment. If these first-line interventions do not result in improvement and symptoms cause at least moderate disruption of the child's ability to function, then medication (specifically methylphenidate) may be considered. A previous study has suggested that diagnoses of ADHD and prescribing of stimulant medication for preschoolers may have stabilized after publication of these 2011 guidelines.[3] In that study, rates of diagnosis and prescribing were examined for children seen in primary care offices between 2008 and 2014, and significant variations among practice sites in both the diagnosis of ADHD and prescribing of stimulants were noted.[3]

We undertook the present study to look at stimulant medication use in preschoolers with ADHD in the Kentucky Medicaid population from 2012 to 2016 and to determine whether the diagnosis of ADHD and prescribing of stimulant medication changed during this period. The National Survey of Children's Health for 2003-2011, based on parent interviews for children aged 4-17, found varying ADHD prevalence rates across the US states, with the lowest rate Nevada (4.2%) and the highest rate in Kentucky (14.8%).[4] Similarly, the Centers for Disease Control and Prevention found Kentucky to have one of the highest rates of ADHD diagnosis (2.01%-3.38%) and treatment with stimulants (84%-90% of those with an ADHD diagnosis) in 2011 for children aged 2-5 years receiving Medicaid.[5] A similar study was reported with data from 2014 for children covered under employer-sponsored insurance in Kentucky.[5] Although these 2 studies compared rates from different years, children covered by Medicaid were diagnosed with ADHD at 4-5 times the rate of those covered by private insurers, but the rates of stimulant prescription were similar in the 2 groups.[5] The previous studies reported annual data from 2011 (Medicaid) and 2014 (employer-sponsored insurance). In the present study, we examined the use of stimulant medication in children aged <6 years with ADHD in the Kentucky Medicaid population from 2012 to 2016. Demographic data, including race/ethnicity, urban residence, and provider type, were collected. Comorbid conditions and involvement in psychosocial care were also analyzed. Finally, predictive models were developed using only 2016 data. Our findings have the potential to inform policy and contribute to the development of targeted interventions.

Methods

Data were extracted from Kentucky Medicaid claims records for 2012-2016. These data contain information on all health services billed through Kentucky Medicaid insurance (service date, prescription, type, location, provider, and associated *International Classification of Diseases, Ninth Revision* [ICD-9] or *International Classification of Diseases, Tenth Revision* [ICD-10] code), as well as patient demographic information, such as date of birth, sex, self-identified race, and postal code for each enrollee. We developed a detailed dataset for a cohort of children aged <6 years in 2016, the most recent calendar year in the Kentucky Medicaid data (n = 208 585). For our analysis, we focused on children who had a diagnosis of ADHD but no stimulant prescription (n = 1596), those with a stimulant prescription but no claim with an ADHD diagnosis (n = 103), and those with both a stimulant prescription and a claim with an ADHD diagnosis (n = 988), further reducing our study sample to a total of 2687 children. Duration of enrollment in Medicaid was not used to exclude any children from the study sample, even though this could potentially bias the estimates provided, because shorter enrollments provide less time to accumulate a claim for ADHD or a medication prescription. We were interested in several outcomes and factors related to an ADHD diagnosis and treatment with stimulant medication for children aged <6 years, including additional psychiatric diagnoses, psychosocial care, and general demographic information. For the analysis described below, annual trends were assessed using annual cross-sectional data from children included in the study sample in each year. The statistical models used a cohort of eligible children in 2016.

Definitions of Psychosocial Care, Utilization, and Diagnostic Categories

Psychosocial care was defined as having at least 1 of the relevant Current Procedural Terminology (CPT) codes (90832-34, 90836-40, 90840, 90845-49, 90853, 90875-76, and 90880) on a claim within the year as the outcome for the generalized linear model. These codes included both outpatient and inpatient visits for individual and group therapy. Psychosocial care was evaluated along with emergency room, outpatient, inpatient, and observational visits by summing over the records with the relevant CPT codes within the study period for each age group. The CPT codes used to identify these outcomes are listed in **Table I** (available at www.jpeds.com).

Psychiatric diagnoses were identified by an ICD-9 code (before October 1, 2015) or ICD-10 code for a psychiatric disorder in any of the 4 available diagnostic code columns on either inpatient or outpatient claims. ADHD was defined by ICD-10 codes F90.0, F90.1, F90.2, F90.8, and F90.9 and by ICD-9 codes 314.00, 314.01, 314.1, 314.2, 314.8, and 314.9 (**Table I**). The most common psychiatric comorbidities were categorized as (1) other neurodevelopmental disorders, including intellectual disability, tic disorders, stereotypical movement disorder, and developmental delays; (2) anxiety and trauma disorders, including anxiety disorders, post-traumatic stress disorder, acute stress disorder, obsessive-compulsive disorder, and related disorders; (3) adjustment disorders, reactive attachment disorder, autism spectrum disorders, and pervasive developmental disorders; (4) other mental disorders, including personality disorders, dissociative disorders, feeding and eating disorders, and sexual and gender identity disorders; and (5) mood disorders, including major depressive disorder and other depressive disorders, mood disorder not otherwise specified, disruptive mood dysregulation disorder, and bipolar disorder.

An additional variable was created to account for the children with 2 or more comorbid psychiatric diagnoses. The diagnostic categories used are listed in **Table I**.

National Drug Codes and Prescribing Provider Categories

Dispensed psychiatric medications were identified using National Drug Codes on a pharmacy claim for the following

medication categories: (1) antidepressants (selective serotonin reuptake inhibitors, serotonin and norepinephrine reuptake inhibitors, tricyclic antidepressants, monoamine oxidase inhibitors, and miscellaneous), (2) anxiolytics (benzodiazepines and miscellaneous), (3) antipsychotics (typical, atypical, and miscellaneous), (4) stimulants and atomoxetine, (5) mood stabilizers, and (6) alpha-agonists.

The prescribing provider categories were created by merging the National Provider Identifier from the prescription billing claim and the classification from the data provided by the National Uniform Claim Committee. The provider categories are Pediatrics, Psychiatry, Family Medicine, Nurse Practitioners and Physician Assistants, and Other.

Covariates

We obtained the following covariates: child age, sex, race, geographic area of residence (urban vs nonurban), and utilization and prescription information, including provider type. The children were divided into 3 subcategories relating to the presence of an ADHD diagnosis or treatment with a stimulant medication. These 3 groups were (1) children with an ADHD diagnosis and treated with stimulant medication, (2) children prescribed a stimulant medication but without an ADHD diagnosis, and (3) children with an ADHD diagnosis not treated with stimulant medication. An additional variable was created for whether a psychiatrist prescribed at least 1 stimulant medication during the year. Comorbidities were included as well.

Age, sex, race, and foster care status were provided by yearly enrollment data files from Kentucky Medicaid. Age was defined as the maximum age during the study period. Urban or nonurban residence was determined using 2013 Rural-Urban Continuum Codes (RUCCs) as defined by the United States Department of Agriculture as was coded as urban when the county of residence had an RUCC of 1-3 and as nonurban when the county of residence had an RUCC of 4-9.

Statistical Analyses

We performed descriptive analyses to summarize the demographic characteristics and assess differences in our sample and annual trends for children treated with stimulant medication. In addition, we created descriptive tables to illustrate the differences related to age, race, and additional diagnoses. We obtained *P* values using the Fisher exact test and the χ^2 test for differences in proportions and trends. We removed children with incomplete records (n = 395; 10%), such as those with no reported race or ethnicity, from our statistical analysis and comparison of additional diagnoses, leaving a final sample size of 2292 children.

A generalized linear model with a logit link and binomial distribution was used to assess factors associated with receiving psychosocial therapy treatment at least once during the 2016 calendar year for the study population. The outcome of interest was tested as a function of the aforementioned covariates, allowing us to test for significant predictors and report ORs with 95% CIs and 2-sided *P* values for the regression model, assessing individual and environmental characteristics. A 2-tailed *P* value of < .05 was considered statistically significant. We performed data preparation and analyses using R statistical software, version 3.4.0 (R Institute for Statistical Computing, Vienna, Austria).

The study was approved by the Institutional Review Board at the University of Louisville. The Kentucky Department of Medicaid Services Data approved the use of its data in this study.

Results

The rate of stimulant prescriptions has declined steadily since 2012, with the greatest change seen in children in foster care (**Table II**). The percentage of children aged 0-5 years on Kentucky Medicaid receiving stimulants decreased from 0.9% in 2012 to 0.5% in 2016 (**Table II**). The decrease is not statistically significant, however. Similar decreases in prescription rates 2012 to 2016 were seen for children living in urban areas (from 0.9% to 0.6%) and those living in nonurban areas (from 1.0% to 0.6%). In 2016, 2584 (1.24%) preschool-aged children receiving Kentucky Medicaid had a diagnosis of ADHD, 988 of whom (38.2%) of those received a stimulant medication.

Table II. Annual trends for children aged <6 years on Kentucky Medicaid with stimulant prescriptions, 2012-2016

Demographic characteristics	2012 (N = 204 697), n (%)	2013 (N = 199 941), n (%)	2014 (N = 204 567), n (%)	2015 (N = 205 615), n (%)	2016 (N = 208 585), n (%)
Total with stimulant prescription	1756 (0.9)	1637 (0.8)	1394 (0.7)	1210 (0.6)	1091 (0.5)
ADHD diagnosis	1524 (86.8)	1387 (84.7)	1227 (88.0)	1092 (90.3)	988 (90.6)
Psychosocial care	483 (27.5)	729 (44.5)	651 (46.7)	528 (43.6)	500 (45.8)
Foster care	139 (3.8)	146 (3.8)	129 (3.3)	113 (2.8)	82 (2.0)
Urban/nonurban					
Urban	693 (0.9)	639 (0.8)	571 (0.7)	487 (0.6)	445 (0.6)
Nonurban	1053 (1.0)	988 (1.0)	817 (0.8)	714 (0.7)	641 (0.6)
Race					
White, non-Hispanic	1140 (0.8)	1052 (0.8)	918 (0.7)	829 (0.7)	759 (0.6)
Black, non-Hispanic	167 (0.6)	158 (0.6)	119 (0.5)	107 (0.4)	119 (0.5)
Hispanic	31 (0.3)	23 (0.2)	28 (0.3)	29 (0.3)	19 (0.2)
Other	41 (0.5)	42 (0.5)	33 (0.3)	18 (0.2)	19 (0.4)
Not provided	377 (1.9)	362 (1.9)	296 (1.2)	227 (0.7)	175 (0.5)
Sex					
Female	455 (0.5)	439 (0.5)	362 (0.4)	322 (0.3)	267 (0.3)
Male	1301 (1.2)	1198 (1.2)	1032 (1.0)	888 (0.8)	824 (0.8)

The percentages shown were calculated with the numerator as the number of children in each subgroup with stimulant prescriptions. and the denominator representing the total number of children covered under Kentucky Medicaid in the subgroup for the applicable year.

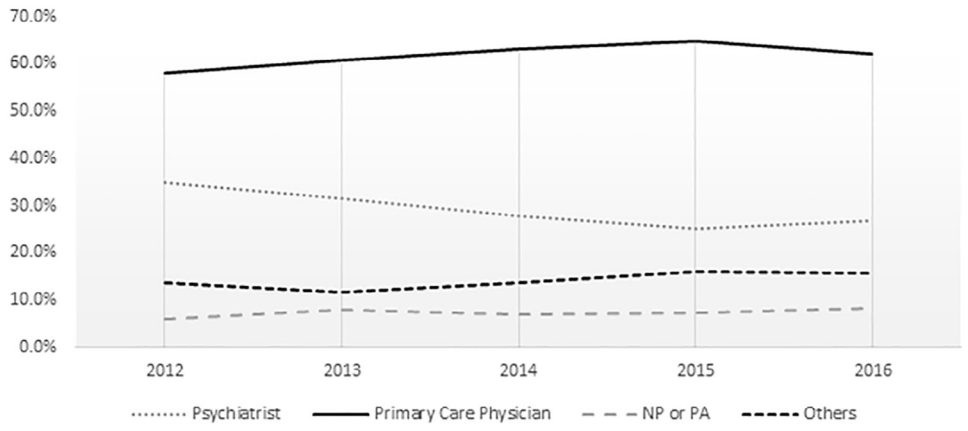

Figure. Percentage of stimulant prescriptions, by prescriber type, for children on Kentucky Medicaid with a stimulant prescription in 2012-2015.

Children in foster care were treated for ADHD 4 times more often than other Medicaid recipients. Of the 1091 preschoolers receiving stimulants, 103 (9%) did not have a Medicaid claim with a diagnosis of ADHD. In 2016, 2% of preschoolers in foster care received stimulant medication, compared with 0.5% of their peers on Kentucky Medicaid not in foster care. Males received stimulants twice as frequently as females. Non-Hispanic white children had the highest rate of receiving stimulants, followed by non-Hispanic black children. Hispanic children received stimulants at the lowest rate. The majority of the children were prescribed stimulants by their primary care physician (**Figure**). Race/ethnicity was not known in 0.5% of the children in 2016, compared with 0.9% in 2012, reflecting improved reporting from 2012 to 2016.

Seventy-five children aged <3 years in the study group had either a diagnosis of ADHD or were on a stimulant medication. In that age group, the vast majority of children had a diagnosis of ADHD but did not receive a stimulant, including 83% of those aged <1 year, 93% of those aged 1 year, and 100% of those aged 2 years. That is, among the children with either a diagnosis, a stimulant prescription, or both, 83%-100% had a diagnosis only. The use of stimulants to treat ADHD increased with increasing age thereafter. A diagnosis of ADHD without a stimulant prescription was seen in 85% of children aged 3 years, in 67% of those aged 4 years, and in 52% of those aged 4 years. Of concern, 4%-9% of the sample had a prescription for a stimulant medication filled in 2016 without a Medicaid claim including a diagnosis of ADHD.

Table III displays comorbid diagnoses assigned to children with a diagnosis of ADHD by race/ethnicity. Of note, overall, 24.8% of children diagnosed with ADHD also had a diagnosis of anxiety or trauma, 34.1% had a diagnosis of another neurodevelopmental disorder, and 23.4% had 2 or more additional diagnoses. Significant racial/ethnic disparities were seen in the additional diagnosis of autism spectrum disorders in black children, other mental disorders in Hispanic children, and in the children with 2 or more additional diagnoses. We also examined racial/ethnic differences for children with both a diagnosis of ADHD and a prescription filled for a stimulant medication but found no statistically significant differences.

Finally, we looked at factors associated with the likelihood of a child receiving at least 1 psychosocial intervention in 2016 (**Table IV**). The rate of psychosocial therapy was higher in

Table III. Additional diagnoses for children with ADHD, by race/ethnicity in 2016

Diagnoses	Overall, n (%)	Black, n (%)	Hispanic, n (%)	White, n (%)	Other, n (%)	*P* value
ADHD	2210	265	68	1833	44	
Anxiety and trauma	548 (24.8)	64 (24.2)	14 (20.6)	457 (24.9)	13 (29.6)	.74
Autism and PDD NOS	186 (8.4)	11 (4.2)	9 (13.2)	163 (8.9)	3 (6.8)	.018*
Impulse control disorders	55 (2.5)	6 (2.3)	3 (4.4)	46 (2.5)	0 (0.0)	.541
Mood disorders	142 (6.4)	19 (7.2)	5 (7.4)	115 (6.3)	3 (6.8)	.862
Depressive disorders	82 (3.7)	13 (4.9)	2 (2.9)	66 (3.6)	1 (2.3)	.724
Seizures/convulsive disorders	75 (3.4)	5 (1.9)	4 (5.9)	64 (3.5)	2 (4.6)	.237
Schizophrenia, psychotic processes	16 (0.7)	2 (0.8)	0 (0.0)	14 (0.8)	0 (0.0)	.999
Other mental disorders	175 (7.9)	19 (7.2)	12 (17.7)	142 (7.8)	2 (4.6)	.042*
Other neurodevelopmental disorders	754 (34.1)	75 (28.3)	23 (33.8)	641 (35.0)	15 (34.1)	.199
Two or more additional diagnoses	516 (23.4)	44 (16.6)	21 (30.9)	440 (24.0)	11 (25.0)	.019*

PDD, pervasive developmental disorder.
Children missing race and ethnicity information were excluded.
*$P < .05$.

Table IV. Factors associated with the likelihood of receiving psychosocial therapy at least once in 2016 for children with ADHD receiving stimulant medication, children without ADHD receiving stimulant medication, and children with ADHD but without stimulant medication

Covariates	OR (95% CI)	*P* value
Group 1: Children with ADHD receiving stimulant medication	Reference	
Group 2: Children without ADHD receiving stimulant medication	0.48 (0.28-0.79)	.005
Group 3: Children with ADHD, without stimulant medication	1.56 (1.28-1.9)	<.001
Having at least 1 prescription from a psychiatrist	3.13 (2.42-4.09)	<.001
Having at least 2 psychiatric diagnoses	1.60 (1.45-1.77)	<.001
Age increase of 1 y	1.58 (1.39-1.79)	<.001
Living in an urban area	Reference	
Living in a nonurban area	0.88 (0.73-1.05)	.146
Race/ethnicity: white, non-Hispanic	Reference	
Race/ethnicity: black, non-Hispanic	1.25 (0.95-1.63)	.108
Race/ethnicity: Hispanic	0.91 (0.54-1.53)	.723
Race/ethnicity: other	0.99 (0.52-1.85)	.978
Female sex	Reference	
Male sex	1.04 (0.85-1.27)	.698

Of the 2292 children included in the model, 1047 (46%) had a medical claim for psychosocial care.

children diagnosed with ADHD who did not receive a stimulant compared with those with ADHD who received a stimulant, and higher in the latter group compared with the children without a diagnosis of ADHD who received a stimulant. Other factors associated with an increased likelihood of receiving psychosocial care were at least 1 prescription written by a psychiatrist, at least 2 psychiatric diagnoses, and older age. Race/ethnicity, urban vs nonurban residence, and sex were not associated with receipt of psychosocial care.

Discussion

This study describes longitudinal trends in the diagnosis of ADHD and prescription of stimulants for children aged <6 years from low-income families. A robust, state-wide Medicaid administrative database was used. Fiks et al examined ADHD diagnosis and stimulant use in preschoolers (aged 4-5 years) between January 2008 and July 2014 by extracting data from 63 primary care practices to determine whether provider behaviors changed after release of the 2011 American Academy of Pediatrics' guidelines.[3] Our present study extends that work by examining children from birth through age 5 years and continuing through December 2016. In additionally, we looked specifically at children covered by Medicaid, who are more likely than their peers to be prescribed stimulants. We examined children from Kentucky, which has one of the highest stimulant medication prescribing rates in the US.[6]

A modest but steady decrease in the use of stimulant medications in children aged <6 years was seen, dropping from 0.9% in 2012 to 0.5% in 2016. Similarly, children in the same age group who were in foster care received stimulants at a rate of 3.8% in 2012 and 2.0% in 2016. A small percentage of children received a stimulant without a diagnosis of ADHD.

Primary care physicians were the most frequent prescribers of stimulant medications, and nurse practitioners/physician assistants were the least frequent prescribers. Psychiatrists were the next most frequent prescribers. Children receiving at least 1 prescription a year by a psychiatrist were more likely to receive psychosocial interventions.

Although we present new findings in young children with ADHD and/or stimulant medications, this study has some limitations. Administrative claims data are known to have limitations,[7] including the fact that data are captured only when a claim is submitted. For some services known to be frequently denied or for which reimbursement is low, such as psychosocial care, a claim might not be submitted.[7] In addition, if payments are "bundled" for groups of services, a claim is not filed. The bundling of services is known to occur for some children in foster care, such as those in residential facilities. Data on the type of services provided or the quality of such services are not available. Claims data also provide little insight into disease characteristics, severity, symptoms, etc.[7] We identified cases if a child had 1 medical claim with a diagnosis of ADHD. Using only a single claim could result in overreporting due to coding errors or use of codes when ruling out the diagnosis of ADHD. A preferred solution in the future would be to refine the definition to only include cases with 2 or more claims with a diagnosis of ADHD. Another limitation is that race/ethnicity is an optional field in the claims data. As such, it was not provided for 1.9% of our sample in 2012 and 2013, which decreased to 0.5% in 2016. In addition to the limitations of the dataset, we coded the area of child residence as urban/nonurban. Future studies would benefit from a finer examination of geographic location, as well as an examination of available community resources, such as mental health providers within a 50-mile area. More specific assessment of the characteristics of available behavioral health services, such as timing, duration, quality, provider type, and specific components of the intervention, would also strengthen future studies. The American Academy of Pediatrics guidelines suggest implementing psychosocial care before initiation of stimulant medication (ie, first-line psychosocial care).

The current study provides encouraging new data suggesting a downward trend in prescribing stimulant medications to preschool-age children since the publication of the 2011 clinical practice guidelines. Continued vigilance is needed to ensure that the trend remains stable or continues to improve. The effects of long-term stimulant medication use in very young children remain unclear. Follow-up studies of preschool children treated for ADHD are scarce. One study found that approximately 75% of those preschoolers who received a stimulant medication in the Preschool ADHD Treatment Study (PATS) were still receiving medication 6 years later, and 10% of those children were prescribed an antipsychotic agent.[8] Polypharmacy was also relatively common, with approximately 25% of the children receiving more than 1 psychotropic medication at the 6-year follow-up assessment.[8]

Our study findings are consistent with previous studies showing that ADHD in preschoolers is likely to be accompanied by comorbid conditions, such as neurodevelopmental and mental health disorders.[9,10] This added complexity suggests that these children would benefit from a multidisciplinary team of providers to ensure optimal outcomes. Our findings are consistent with those recently published for school-age children with ADHD.[11] Specific similarities include higher rates of stimulant prescribing for children reported as white compared with black and Hispanic children, less use of behavioral therapy for children treated by primary care physicians compared with those treated by psychiatrist and neurologists, and low rates of behavioral health interventions.[11]

In young children, especially those living in poverty, a number of factors may be associated with attention and behavioral problems, such as exposure to adverse childhood events,[12] sleep problems,[13] and chaotic home environments.[14] In addition, parenting practices have been associated with differences in attention and attention regulation.[15,16] Therefore, it is important to monitor the provision of psychosocial therapy and to ensure that a diagnosis of ADHD is made only after careful consideration of the child, family, and environmental factors that may contribute to the child's behavior. Nonpharmacologic treatment has proven effective.[17] One comparative effectiveness study found that parent behavior training had a greater effect than stimulants in preschool-age children.[17] Another multisite study that examined multimodal interventions found significant complexity in the effects of medication, behavioral management, and combination therapies, as well as differences when the medication therapy was administered in a community "typical care" model[18]; however, that study evaluated children aged 7-9.9 years, and thus the results might not be generalizable to the preschool population. Children with comorbid anxiety disorders and those from low-income families benefited from the combined medication and behavioral intervention therapy, with improved parent-reported symptoms and teacher-reported social skills and parent-child interactions.[18] The majority of children insured by Kentucky Medicaid have their health plan benefits administered by managed care organizations (MCOs). This research identifies focal points for MCOs to target resources to improve the quality of care for vulnerable populations, such as younger children interacting with foster care. Traditional MCO activities may include provider education, distribution of evidence-based tools to assist providers with accurate diagnosis and more effective treatment decisions, and direct patient support, such as case management services, patient education, and assistance with strategies for optimizing medication adherence or achieving appropriate follow-up clinical visits. In addition to provider- and patient-level support, MCOs could implement such population-based health strategies as pharmacy database monitoring and establishment of value-based contracts that financially incentivize the documentation of guidelines-based ADHD care and desired clinical outcomes. Governmental agencies overseeing public health insurance and child welfare could explore mutually beneficial regulatory reforms and blending governmental funding to support shared policy goals.

Kentucky has implemented some mutually beneficial collaborative efforts among government agencies to improve the quality of care for children receiving psychotropic medications who are in the foster care system and eligible for Medicaid benefits. The first example of these efforts is the strategic placement of a child psychiatrist into a chief medical officer role, supported via Medicaid administrative claiming funds, whose responsibilities are focused on clinically grounded policies for children in foster care. In addition, Kentucky state government information systems are increasingly implementing master client indices that link foster care information regarding placement, demographic data, or child welfare expenditures with other complementary data, such as Medicaid claims or the state's prescription drug monitoring program. Moreover, state government leadership in Kentucky is specifically exploring how to decouple behavioral health service payments from funding allocated for residential foster care services, so that federal financial participation through programs like Medicaid can be fully applied to maximize access to behavioral health services, as well as to better enable data-driven monitoring.

Reaching beyond children in the foster care system, persons with intellectual or developmental disabilities (who may include some children receiving stimulant medications) may receive needed services through the Michelle P. Waiver, a home- and community-based waiver program of Kentucky Medicaid developed as an alternative to institutional care. The structure of this waiver program allows for more direct government oversight instead of relying on managed care and may offer specific opportunities for collaborative contractual revisions that can more effectively leverage prescription monitoring or enhanced data collection for improved care planning and quality health care delivery.

More research is needed to better understand the timing, dose, provider type, and intervention characteristics necessary to improve long-term child outcomes through the use of behavioral health interventions and parent behavior training for young children at risk for developing ADHD. Much remains unknown about the long-term effects of stimulants on the developing brains of very young children, suggesting the need for caution when treating this population, as well as the need to consider and evaluate alternative strategies for first-line treatment. ■

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Table I. Codes and categories for diagnoses and procedures

Categories of diagnosis and procedure codes	CPT codes	
Psychosocial care	90832-90834, 90836-90840, 90845-90849, 90853, 90875, 90876, 9088, 90880	
	ICD-9 codes	ICD-10 codes
Attention-deficit disorder	314.xx	F90x
Schizophrenia and other psychotic processes		
Schizophrenia and schizoaffective disorder	295.xx	F20, F200-F205, F208, F2081, F2089, F209, F25.0, F25.1
Delusional disorders	297.x	F22
Other nonorganic psychoses	298.x	F28, F23, F29
Mood disorders total		
Depressive disorders (listed below)	296.20-296.36, 300.4, 311, 625.4	F32.0-F32.5, F32.8, F32.9, F33.0- F33.3, F33.8, F33.9, F33.41, F33.42, F34.1, N94.3
Bipolar and related disorders	296.00-296.10, 296.40-296.89, 301.13	F30.10-F30.4, F30.8, F30.9, F31.0-F31.9, F34.0
Mood disorder NOS	296.9	F06.3, F39
Disruptive mood dysregulation disorder	296.99	F34.8
Depressive disorders		
Major depressive disorder and other depressive disorders	296.20-296.36, 300.4, 311, 625.4	F32.0-F32.5, F32.8, F32.9, F33.0- F33.3, F33.8, F33.9, F33.41, F33.42, F34.1, N94.3
Disruptive mood dysregulation disorder	296.99	F34.8
Autism spectrum disorders	299.xx	F80.89, F84, F840, F842, F843, F845, F848, F849
Other neurodevelopmental disorders		
Intellectual disability	317.xx, 318.xx, 319.xx, 758	Q909, F70-F73, F78, f79
Tic disorders	307.20-307.23	F95, F950-F952, F958, F959
Stereotypical movement disorder	307.3	F984
Developmental delays	315.xx	F80, F80.81, F80.9, F81, F81.1, F81.2, F82, F88, F89
Anxiety- and trauma-related disorders		
Anxiety disorders	300.00-300.29, 309.21, 301.4, 312.23	F40-F419, F93.0, F94.0
Post-traumatic stress disorder and acute stress disorder	308.3, 309.81, 309.89, 309.9	F430, F431-F4312, F43.8
OCD and related disorders	300.3, 300.7, 312.39	F42, F45.22, F63.2, L98.1
Adjustment disorders	309.0, 309.24, 309.28, 309.3, 309.4, 309.89, 309.9	F43, F432-F439
Reactive attachment disorder	313.89	F938, F941, F942, F988
Other mental disorders		
Mental disorders, condition classified	293.xx, 294.xx	F53, F02-F062, F064, F068, F524
Disturbance emotions childhood adolescence	313.9x	F939, F948, F989
Feeding and eating disorders	307.1, 307.50, 307.51, 307.52, 307.53, 307.59	F50x, F982, F9821, F9829, F983
Personality disorders	301.0, 301.1x, 301.2x, 301.3, 301.5x, 301.6, 301.7, 301.8x, 301.9, 301.0	F21, F34, F340, F341, F60-F609, F68-F69
Syndromes elsewhere unclassified	307.xx	F98.0, F98.1, F99
Sexual and gender identity disorders	302.2-302.9	F52, F520- F522, F5221, F5222, F523, F5231-5232, F524-F526, F528, Ff29, F64-F66
Dissociative disorders	300.14, 300.12, 300.15, 300.6	F44.0-F44.7, F44.81, F44.89, F448-F449
Impulse control		
Intermittent explosive disorder and impulse control	312.30-312.34, 312.89, 312.9	F63-F632, F633, F638-F639
Physical diagnostic categories		
Seizure epilepsy	345.XX	G40
Other convulsions	780.39	R56.9
Post-traumatic seizures		R56.1
Two or more additional diagnoses categories		
Autism spectrum disorders		
Anxiety and trauma-related disorders		
Other mental disorders		
Other neurodevelopmental disorders		
Schizophrenia and other psychotic processes		
Impulse control		
Mood disorders total		
Seizures/other convulsions		

NOS, not otherwise specified.