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Prescription Drug Use and Cost Trends Among Medicaid-Enrolled Children with Disruptive Behavioral Disorders

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Abstract

Disruptive behavior disorders (DBDs) are the most common mental health conditions in children. These conditions profoundly affect healthcare utilization and costs. Service use, costs, and diagnostic trends among pediatric Medicaid beneficiaries provide information regarding healthcare quality and potential for smarter spending. Using nationwide Medicaid administrative data, this study investigates diagnoses, prescription drug fills, and payments in 49 states and D.C. from 2006 to 2009 in Medicaid beneficiaries age 20 and under. Psychotherapeutic drug prescriptions and payments were calculated as a proportion of prescription totals. Results were considered by age, gender, race, and state. The results show a trend of increasing DBD diagnosis. Among prescription claims for children with diagnosed DBD, psychotherapeutic drug claims represented 30–40% of prescription claims but over half of prescription costs. This study indicates increasing clinical and financial needs for Medicaid-enrolled children with DBDs. Medicaid could potentially foster reforms in pediatric DBD treatments, particularly regarding medication use.

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Background

Disruptive behavior disorders (DBDs) include common mental health diagnoses in children such as attention-deficit/hyperactivity disorder (ADHD),* oppositional defiant disorder (ODD), and conduct disorder (CD).¹ The pediatric population in the USA includes children up to age 21, many who are served by Medicaid or the Children's Health Insurance Program (CHIP).² Children with DBDs often have difficulty following rules and behaving in socially acceptable ways, exhibiting behaviors ranging from inattentiveness and fidgeting to aggression, destructiveness, chronic defiance of rules, lying, or stealing. Failure to treat DBDs in children may result in issues that persist into adulthood and impact the ability to hold a job, observe societal norms, and form healthy relationships with other people.^{1,3}

The Centers for Disease Control and Prevention reports that 13 to 20% of children experience mental health issues in a given year. ADHD and CD affect 6.6 million US children ages 12 to 17, and rates of diagnosis are rising; for instance, 7.8% of children were diagnosed with ADHD in 2003 compared to 11% in 2011.⁴⁻⁷ Children enrolled in Medicaid are more likely than other children to have a DBD diagnosis.^{8,9}

Perceptions that DBDs are over-diagnosed and over-treated are common.^{10,11} Though diagnoses of DBDs in children have been increasing,^{12,13} studies indicate that a majority of children who need mental health services do not receive adequate care.¹⁴ Expression of DBD symptoms, prevalence of DBD diagnoses, access to appropriate treatments, and parental perceptions of the need for care vary within and among gender, social class, and racial-ethnic groups,¹⁵⁻¹⁷ and insurance status and access to care often vary by geographic location.

Psychotherapeutic drugs are prescribed to treat mental illness or disorders.¹⁸ Nationally, the supply of licensed child-adolescent psychiatrists is estimated to be well under half of current needs, with the ratio of child psychiatrists to children with a mental health diagnosis at approximately 1:1800.^{19,20} Thus, many children receive mental health services from primary care physicians who generally do not have extensive training in psychiatry but issue the vast majority of psychotherapeutic drug prescriptions for children.^{21,22} Some states also extend prescription privileges to psychologists and advance practice nurses.^{23,24} Children are far more likely to receive medication alone than obtain behavioral health services alone or in combination with medication.²⁵ Variation in psychotherapeutic prescription practices among providers is of particular concern in light of a steep increase in off-label prescriptions, particularly for antipsychotics.²⁶ A national survey of office visits among children age 20 and under found that a DBD diagnosis was the diagnosis most likely (37.8%) to be treated with antipsychotic medications, even though DBDs are not an FDA-approved indication for antipsychotic use.^{27,28}

By 2010, more than 31 million children in the USA were insured through Medicaid and CHIP, which provide comprehensive health benefits for about half of low-income children in the USA.²⁹ The shortage of mental health providers is most acute for these children, as many providers do not accept public insurance, and a recent US Department of Health and Human Services study found that more than half of listed Medicaid providers do not offer appointments to enrollees or could not be contacted.³⁰ Care shortages are exacerbated as needs rise among children enrolled in Medicaid or CHIP.¹³

Medicaid and CHIP are the leading payer for pediatric mental healthcare, covering 26% of an estimated \$247 million per year.^{13,31,32} An Annie E. Casey Foundation study found that while fewer than 10% of Medicaid-enrolled children use behavioral health services, these services account for 38% of total spending. Medicaid benefits are increasingly provided by managed care

* Although ADHD was classified as a behavior disorder with ODD and CD in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders*, it has been reclassified as a neurodevelopmental disorder in DSM-V.⁵³ Because of the high level of comorbidity and similarities in pharmacological treatment profiles, and because the DSM-IV was in use during the study period, the DSM-IV definition of DBD is used in this paper.

organizations (MCOs) rather than traditional fee-for-service (FFS) reimbursement to providers, and delivery varies among and within states, creating variations in service penetration that may include behavioral health carve-outs.³³

Understanding disease prevalence and prescription payments provides foundational knowledge for designing appropriate and innovative care delivery and payment models for vulnerable children.³⁴ Using existing Medicaid and CHIP administrative data, this study assesses beneficiaries with disruptive behavioral disorders age 20 and under who used health services, their associated prescription drug use, and their claims payments from 2006 to 2009.

Methods

The Medicaid Analytic eXtract (MAX) files, developed by the Centers for Medicare & Medicaid Services (CMS), convert state Medicaid administrative data from the Medicaid Information Statistical System (MSIS) into a consistent national format. MAX data include enrollment and claims information by calendar year and information on beneficiaries' eligibility, program type, demographic characteristics, managed care enrollment, health services, and medication utilization and costs.^{35,36} CHIP beneficiaries are included in the MAX files for states that receive federal matching funds for beneficiary care. For simplicity's sake, the programs are hereafter referred to as Medicaid. First Databank (FDB) base data were used to extract drug therapeutic class information for prescription drug claims.³⁷

Retrospective descriptive analysis was used to investigate pediatric DBD diagnosis and prescription use. MAX inpatient, long-term care, and other claims types from 2006 through 2009 identified Medicaid beneficiaries age 20 and under with at least one claim for an office visit or inpatient stay that included a DBD diagnosis.³⁸ For each year, ICD-9 diagnosis codes identified individuals with claims related to DBDs, including ADHD or CD and subtypes such as impulse control disorder and hyperkinetic syndromes (refer to Table 1 for a complete list).

The total number of unique Medicaid beneficiaries, their total prescriptions filled (TPF), and Medicaid payments for prescriptions (MPP) were calculated for 49 states and Washington, D.C.[†] To understand financial burdens of DBD-related prescriptions, the proportion of Medicaid payments for psychotherapeutic drugs was calculated against all prescribed medication payments for these children for each year. Psychotropic drug spending was calculated using a list of 53 commonly used psychotherapeutic drugs, such as Abilify®, Cymbalta®, Doxepin, and Ritalin®. TPF and MPP were aggregated for each year. For purposes of comparison, the number of prescriptions filled and total payments per beneficiary per year (PBPY) was calculated by dividing aggregated TPF and MPP by the number of beneficiaries. Results were examined by age, gender, race ethnicity, and state to investigate prevalence, costs, and treatment variations.

Age was categorized from ages 0 to 5, 6 to 12, 13 to 18, and 19 to 20 and calculated by individual birth date and December 31 of the file year. Medicaid administrative data reports seven race categories, but to avoid very small subgroups, race was consolidated into four categories: White, Black, Hispanic/Latino, and Other. Results are discussed here specifically for White, Black, and Hispanic/Latino children because the "Other" category was highly varied and included many children with "unknown" race ethnicity.

Results

In 2006, 1.31 million of the 33.3 million Medicaid beneficiaries age 20 and younger (3.95%) had at least one office visit that included a diagnosis code for at least one DBD. Among all DBD-diagnosed children, 88.7% had at least one prescription and 59.3% had at least one psychotherapeutic drug prescription during that year. A total of 19.5 million prescriptions were filled for all DBD-diagnosed

[†] Maine is not included because it is not in the data system the authors are using.

Table 1
Diagnosis codes for disruptive behavioral disorders (DBDs)

ICD-9 diagnosis code	Disruptive behavioral disorder description
312.01	Under socialized conduct disorder, aggressive type, mild
312.02	Under socialized conduct disorder, aggressive type, moderate
312.03	Under socialized conduct disorder, aggressive type, severe
312.10	Under socialized conduct disorder, unaggressive type, unspecified
312.11	Under socialized conduct disorder, unaggressive type, mild
312.12	Under socialized conduct disorder, unaggressive type, moderate
312.13	Under socialized conduct disorder, unaggressive type, severe
312.20	Socialized conduct disorder, unspecified
312.21	Socialized conduct disorder, mild
312.22	Socialized conduct disorder, moderate
312.23	Socialized conduct disorder, severe
312.30	Impulse control disorder, unspecified
312.31	Pathological gambling
312.32	Kleptomania
312.33	Pyromania
312.34	Intermittent explosive disorder
312.35	Isolated explosive disorder
312.39	Other disorders of impulse control
312.4	Mixed disturbance of conduct and emotions
312.81	Conduct disorder, childhood onset type
312.82	Conduct disorder, adolescent onset type
312.89	Other conduct disorder
312.9	Unspecified disturbance of conduct
314.00	ADD without mention of hyperactivity
314.01	ADHD with hyperactivity
314.1	Hyperkinesis with developmental delay
314.2	Hyperkinetic conduct disorder
314.8	Other specified manifestations of hyperkinetic syndrome
314.9	Unspecified hyperkinetic syndrome

children at a cost of \$1.62 billion dollars to Medicaid. The average DBD-diagnosed beneficiary had 16.8 prescriptions filled per year, and the total prescription drug payment per DBD-diagnosed beneficiary per year averaged \$1392. Within prescription totals, 39.6% of drug fills were for psychotherapeutic drugs, but these drugs represented 54.6% of all drug costs.

From 2006 to 2009, the number of Medicaid beneficiaries diagnosed with DBDs increased 24.5% while the overall increase in pediatric Medicaid/CHIP enrollment was only 8.8%. The percentage of DBD-diagnosed children with at least one prescription filled remained around 90%. The percentage who used any psychotherapeutic drugs and the average cost for individual beneficiaries remained stable. However, because the proportion of children with a DBD diagnosis rose to 4.5%, a 14.4% increase, absolute prescription numbers and costs for this population increased. The total increase in TPF and MPP reflect the increase in children with DBDs, with a 27.2% rise in TPF and a 28.8% rise for MPP. Payments for psychotherapeutic drugs as a total proportion of prescription drug payments rose only slightly, from 54.6% in 2006 to 57.7% in 2009 (refer to Table 2 and Fig. 1 for more information).

Table 2
Trends of prescription drug (Rx) use and payments in DBD-diagnosed children in Medicaid, 2006–2009

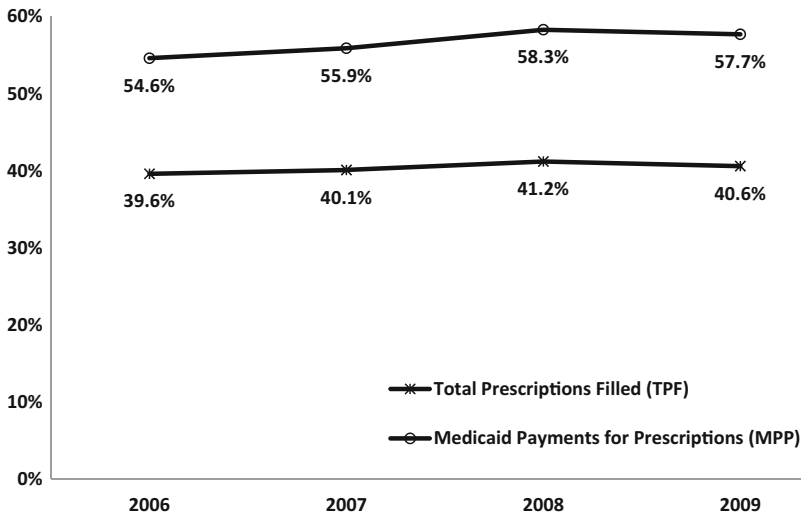
Year	Total children in Medicaid ^a	Total children with DBD	Millions	Children with DBD and any drug use	Millions	Children with DBD and any psych drug use	Millions	Total prescriptions filled (TPF)	Millions	PBPY	Billions	Medicaid payments for prescriptions (MPP)
	a	b (b/a)		c (c/b)		d (d/b)	e	e/c		f/c	f	
2006	33.3	1.31 (3.95%)		1.17 (88.7%)		0.78 (59.3%)	19.5	16.8			\$1.62	\$1392
2007	33.3	1.37 (4.11%)		1.20 (87.6%)		0.81 (59.1%)	20.1	16.8			\$1.75	\$1466
2008	34.2	1.46 (4.28%)		1.30 (88.6%)		0.89 (60.8%)	21.7	16.8			\$1.96	\$1515
2009	36.2	1.64 (4.52%)		1.46 (89.4%)		1.00 (61.1%)	24.9	17.0			\$2.09	\$1428
% increase (2006–2009)	(8.8)	(24.5)		(25.6)		(3.03)	(27.2)	(1.33)			(28.8)	(2.56)

DBD disruptive behavioral disorders, PBPY per beneficiary per year

^aIncludes children in both managed care and fee for service

Figure 1

Trends in the proportion of psychotherapeutic drug prescriptions and costs relative to all prescriptions for children diagnosed with DBD in Medicaid, 2006–2009



Trends for prevalence and cost increases were similar across years for all age groups. The greatest changes of PBPY for both medication usage (measured by TPF) and program payment (measured by MPP) appeared among 19- and 20-year-old beneficiaries (with MPP PBPY changing from \$2364 in 2006 to \$2245 in 2009), followed by the 13- to 18-year-olds (with MPP PBPY changing from \$1683 in 2006 to \$1768 in 2009). Children aged 5 and younger had the lowest PBPY costs and rates of psychotherapeutic drug use, with psychotherapeutic drugs representing 16.5% of their TPF in 2006, and accounting for 30.0% of MPP in 2006 and 28.1% in 2009. Costs rose, peaked in 2008, then decreased slightly in 2009, a trend observed in each age group (refer to Table 3 for more information).

Results show that boys were more than two times as likely as girls to have a DBD diagnosis. Despite the substantial difference in diagnosis rates, 2009 per beneficiary per year prescription drug fills were almost the same for boys and girls, at 17.4 versus 16.8, respectively, with the PBPY drug spending slightly higher for boys (\$1475) than for girls (\$1318). Costs for psychotherapeutic drugs represented 55.4% of total prescription costs for boys and 52.3% for girls in 2006. The higher proportion for boys is consistent across years, and the increasing trend in the proportion is similar for both boys and girls from 2006 to 2009 (refer to Table 4 for more information).

Though overall trends across years were similar for White, Black, and Hispanic/Latino children diagnosed with a DBD, prescription use and costs varied substantially among the groups. The total number of prescriptions for White children exceeded those for Black or Hispanic/Latino children, with the average number of prescriptions filled per year steadily rising from 18.1 in 2006 to 18.5 in 2009. Black children showed an increase from 13.6 to 14.1 in the same time period, while Hispanic/Latino children averaged 14.2 in 2006, dipped to 13.9 in 2008, and then peaked at 14.4 in 2009. As might be expected given the average number of prescriptions, average cost per child was highest among Whites at close to \$1500 per year, while the average was around \$1200 per Black child and \$1100 per Hispanic/Latino child. Whites were the most likely to have prescriptions for psychotherapeutic drugs as part of their total prescription claims, with the percentage peaking at 42.7% of total prescriptions in 2008. Though 2008 was the peak year for all other racial-ethnic

Table 3

Trends of prescription drug (Rx) use and payments by age group among Medicaid-enrolled children diagnosed with DBDs, 2006–2009

Age group	Year	Children with DBD	All prescription drugs			Psychotherapeutic drugs				
			TPF in millions	MPP in millions	TPF per bene per year	MPP per bene per year	TPF in millions (% all Rx)	MPP in millions (% all Rx)	TPF per bene per year	MPP per bene per year
0–5	2006	92,199 (0.8%)	1.14	\$63.2	12.3	\$685	0.19 (16.5)	\$19.0 (30.0)	2.0	\$205.9
	2007	96,756 (0.8%)	1.17	\$67.0	12.1	\$692	0.19 (16.5)	\$21.2 (31.7)	2.0	\$219.3
	2008	106,182 (0.9%)	1.25	\$74.2	11.8	\$699	0.21 (16.8)	\$24.8 (33.4)	2.0	\$233.1
	2009	122,786 (0.9%)	1.47	\$80.4	12.0	\$655	0.23 (15.5)	\$22.6 (28.1)	1.9	\$183.8
6–12	2006	638,393 (7.8%)	10.25	\$809.4	16.1	\$1268	4.18 (40.7)	\$442.7 (54.7)	6.5	\$693.5
	2007	652,097 (8.1%)	10.49	\$864.2	16.1	\$1325	4.35 (41.4)	\$489.7 (56.7)	6.7	\$750.9
	2008	709,983 (8.4%)	11.35	\$965.0	16.0	\$1359	4.88 (43.0)	\$578.9 (60.0)	6.9	\$815.4
	2009	804,293 (8.8%)	13.10	\$1039.9	16.3	\$1293	5.58 (42.6)	\$612.5 (58.9)	6.9	\$761.5
13–18	2006	409,335 (5.7%)	7.53	\$689.0	18.4	\$1683	3.14 (41.8)	\$389.7 (56.6)	7.7	\$952.1
	2007	418,673 (6.0%)	7.76	\$750.2	18.5	\$1792	3.26 (42.0)	\$429.6 (57.3)	7.8	\$1026.2
	2008	445,906 (6.2%)	8.31	\$838.5	18.6	\$1880	3.55 (42.8)	\$492.3 (58.7)	8.0	\$1104.0
	2009	493,807 (6.5%)	9.30	\$873.3	18.8	\$1768	3.93 (42.2)	\$517.3 (59.2)	8.0	\$1047.7
19–20	2006	25,961 (1.4%)	0.62	\$61.4	24.0	\$2364	0.23 (37.2)	\$34.0 (55.4)	8.9	\$1310.2
	2007	29,218 (1.5%)	0.70	\$73.2	24.1	\$2504	0.26 (37.2)	\$41.1 (56.1)	9.0	\$1405.5
	2008	34,333 (1.7%)	0.81	\$86.4	23.7	\$2517	0.30 (36.8)	\$49.2 (56.9)	8.7	\$1432.5
	2009	42,900 (1.9%)	0.98	\$96.3	22.8	\$2245	0.35 (36.0)	\$53.9 (55.9)	8.2	\$1255.9

DBD disruptive behavioral disorders, TPF total prescription filled, MPP Medicaid payments for prescriptions, PBPY per beneficiary per year

Table 4
Trends of prescription drug (Rx) use and payments by gender among children diagnosed with DBD in Medicaid, 2006–2009

Gender	Year	All prescription drugs				Psychotherapeutic drugs			
		Total children diagnosed with DBD	TPF in mil-lions	MPP in mil-lions	TPF per bene per year	MPP per bene per year	TPF in mil-lions all Rx	MPP in mil-lions all Rx	TPF per bene per year
Female	2006	340,546 (2.3%)	5.82	\$437.9	17.1	\$1286	2.12 (36.4)	\$229.1 (52.3)	6.2
	2007	352,539 (2.4%)	6.02	\$474.2	17.1	\$1345	2.21 (36.8)	\$253.6 (53.5)	6.3
	2008	386,156 (2.5%)	6.60	\$535.2	17.1	\$1386	2.48 (37.5)	\$299.3 (55.9)	6.4
	2009	441,363 (2.7%)	7.66	\$581.8	17.4	\$1318	2.82 (36.8)	\$326.1 (56.0)	6.4
Male	2006	825,293 (5.1%)	13.72	\$1185.0	16.6	\$1436	5.62 (41.0)	\$656.3 (55.4)	6.8
	2007	844,170 (5.9%)	14.10	\$1280.3	16.7	\$1517	5.85 (41.5)	\$728.0 (56.9)	6.9
	2008	910,224 (6.1%)	15.13	\$1428.9	16.6	\$1570	6.47 (42.8)	\$845.8 (59.2)	7.1
	2009	1022,387 (6.4%)	17.19	\$1508.1	16.8	\$1475	7.27 (42.3)	\$880.2 (58.4)	7.1

DBD disruptive behavioral disorders, TPF total prescription filled, MPP Medicaid payments for prescriptions, PBPY per beneficiary per year

Table 5

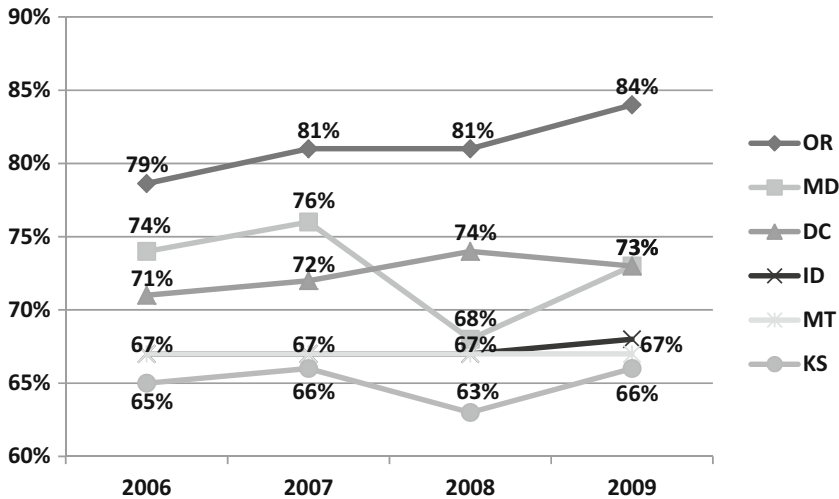
Trends of prescription drug (Rx) use and payments by race group among children diagnosed with DBD in Medicaid, 2006–2009

Race group	Year	Total children diagnosed with DBD	All prescription drugs			Psychotherapeutic drugs				
			TPF in millions	MPP in millions	TPF per bene per year	MPP per bene per year	TPF in millions (% all Rx)	MPP in millions (% all Rx)	TPF per bene per year	MPP per bene per year
Black	2006	261,514	3.56	\$308.8	13.6	\$1181	1.36 (38.1)	\$167.6 (54.3)	5.2	\$640.8
	2007	272,401	3.73	\$343.7	13.7	\$1262	1.44 (38.6)	\$191.0 (55.6)	5.3	\$701.2
	2008	298,000	4.08	\$379.9	13.7	\$1275	1.62 (39.7)	\$223.1 (58.7)	5.4	\$748.6
	2009	333,889	4.69	\$406.2	14.1	\$1216	1.83 (38.9)	\$235.7 (58.0)	5.5	\$706.0
Hispanic/Latino	2006	129,324	1.83	\$138.7	14.2	\$1073	0.60 (32.7)	\$70.1 (50.5)	4.6	\$542.0
	2007	143,016	2.04	\$161.9	14.2	\$1132	0.67 (33.1)	\$85.0 (52.5)	4.7	\$594.2
	2008	164,751	2.29	\$193.4	13.9	\$1174	0.80 (34.9)	\$108.3 (56.0)	4.8	\$657.5
	2009	198,566	2.85	\$234.0	14.4	\$1179	0.97 (33.8)	\$124.3 (53.1)	4.9	\$626.2
Others	2006	113,613	2.19	\$204.8	19.2	\$1802	0.88 (40.2)	\$108.7 (53.1)	7.7	\$956.7
	2007	118,514	2.28	\$224.6	19.2	\$1895	0.92 (40.5)	\$121.2 (54.0)	7.8	\$1022.6
	2008	128,353	2.45	\$252.8	19.1	\$1970	1.01 (41.3)	\$140.3 (55.5)	7.9	\$1093.3
	2009	154,787	2.93	\$272.6	19.0	\$1761	1.20 (40.9)	\$149.4 (54.8)	7.7	\$965.1
White	2006	661,437	11.96	\$970.6	18.1	\$1467	4.90 (41.0)	\$539.1 (55.5)	7.4	\$815.0
	2007	662,813	12.08	\$1024.4	18.2	\$1546	5.03 (41.6)	\$584.4 (57.0)	7.6	\$881.7
	2008	705,300	12.91	\$1137.9	18.3	\$1613	5.51 (42.7)	\$673.4 (59.2)	7.8	\$954.8
	2009	776,544	14.38	\$1177.1	18.5	\$1516	6.10 (42.4)	\$696.8 (59.2)	7.9	\$897.4

DBD disruptive behavioral disorders, TPF total prescription filled, MPP Medicaid payments for prescriptions, PBPY per beneficiary per year

Figure 2

Trends in proportion of psychotherapeutic class to all prescription drug payments for children diagnosed with DBD in Medicaid, 2006–2009, in selected states



groups as well, the percentage of psychotherapeutic drugs relative to all prescription fills that year was 34.9% for Hispanic/Latino children and 39.7% for Black children. However, cost percentages were similar, with psychotherapeutic drugs ranging from a low of 56.0% of total prescription costs for Hispanic/Latino children to a high of 59.2% for White children in 2008 (refer to Table 5 for more information).

To test the robustness of study findings regarding medication use and payments trends, subgroup analysis was repeated for each state from 2006 to 2009. Figure 2 shows results of five selected states (Oregon, Maryland, Idaho, Montana, and Kansas) and Washington, D.C., all of which had psychotherapeutic drug payments larger than 65% of total prescription costs for DBD-diagnosed children in 2006. Though these were among the higher rates observed, state-level subgroup analysis shows that the vast majority of states had an overall proportion of psychotherapeutic drug prescriptions and payments among all prescriptions of over 50%. (Not all results are reported.)

Discussion

Primary findings show that psychotherapeutic drugs consistently represent a high proportion of prescriptions and costs among Medicaid-enrolled children diagnosed with DBDs. The disproportionate increase in DBD diagnosis rates (24.5%) versus the increase in children enrolled in Medicaid (8.8%) indicates an expanding proportion of Medicaid-enrolled children with a DBD diagnosis, a finding consistent with other research suggesting a rising trend for pediatric mental health needs, service provision, and medication.^{25,39} Though individual medications were not studied, the prevalence of DBD diagnoses and the increase in Medicaid resources for psychotherapeutic drugs indicate potential for both service and payment reform. The vast increase in DBD diagnoses among Medicaid-enrolled children and the accompanying rise in prescriptions and costs demonstrate the importance of further assessing diagnosis and drug treatment regimens, whether drug spending in various health plans is efficient, and what access families have to appropriate behavioral health services in addition to appropriate medications.

The highest increase in prescription use and payments was among 19- to 20-year-olds, a finding consistent with overall national increases in DBD-related prescriptions for adolescents found in other studies.^{25,40} Drug treatment for most DBDs is not recommended as a first-line treatment for children under age 6,⁴¹ and the lowest per beneficiary per year prescription drug utilization and payments within this age group. Still, psychotherapeutic drugs represented 16.5% of total prescriptions filled for children age 5 and younger in 2006, accounting for 30.0% of their Medicaid prescription payments in 2006 and 28.1% in 2009. Evidence indicates that therapeutic interventions for parents are among the most effective treatments for DBDs in young children, but during the study period, most parents were not eligible for Medicaid, and so, these services may not have been covered, even if they were available.⁴² This group of children should be studied further to assess the appropriateness of treatments offered and to justify costs.

Subgroup analysis by gender and race shows a high proportion of psychotherapeutic drug use and costs across groups, though within this Medicaid cohort, boys are more likely than girls and White children are more likely than other race groups to be diagnosed with DBDs. The higher rates of DBD diagnosis rate in boys and Whites are consistent with national data on ADHD and CD. However, it is important to note that many scholars believe that girls have these disorders in much greater numbers, but are diagnosed less frequently than boys because their symptoms are more likely to involve inattention or internalizing behaviors rather than aggression.⁴³ Furthermore, treatment studies for DBDs have almost exclusively focused on boys; therefore, there are significant questions as to the efficacy of widely used DBD treatments in girls.⁴² The gaps between boys and girls in diagnoses and prescriptions are smaller in this Medicaid population than some reported in the literature for children in general; for instance, samples indicate a prevalence of conduct disorder of up to 8.8% for males but only 1.4% for females.⁴³ The lower proportion of psychotherapeutic drug prescriptions for Black and Hispanic/Latino children could be a result of access barriers and the shortage of psychiatric providers; it could also be a result of particular reluctance among parents in these groups to access mental health services or cultural differences in parents' perceptions about their children's behaviors.

Though Medicaid programs and operations vary substantially from state to state, the study found the trends of high psychotherapeutic drug use among DBD-diagnosed children to be consistent in almost all states. This could imply consistency in clinical treatment standards. However, as psychotherapeutic drugs prescribed are not always approved for treatment of DBDs or have not been studied for certain age groups, in order to provide more specific clinical guidance and recommendations, further studies should consider the use of particular medications, such as antipsychotics or stimulants, and investigate their use and costs within and among states for Medicaid-enrolled children diagnosed with DBDs. Accuracy and completeness of diagnosis should also be considered. High stigma associated with mental health disorders may lead resistance from parents to charting a diagnosis or consulting a mental health specialist and could lead to providers' coding less severe, less stigmatized diagnoses in children's medical records, masking a true need for psychotropic drugs.^{11,44,45}

Though the efficacy of medication treatments is unknown, the authors do know that assessing prescription information in Medicaid administrative data can identify some of the healthcare needs of children with DBDs. Pharmacological treatments for DBDs have had varied results. For example, ADHD is highly responsive to medication treatment, but pharmacological treatment of oppositional defiant disorder (ODD) and conduct disorder (CD) has been tested on a very limited basis.^{46,47} Furthermore, these conditions have been found to be responsive to other treatments, including behavioral therapy and parental interventions. Parental interventions have been found to be particularly effective.⁴² Across the years studied, approximately 60% of children and adolescents with DBDs received pharmacological treatment; however, there is little information on whether children without prescriptions may have been accessing other services. It is possible that these beneficiaries could have received non-pharmacological services, such as behavioral therapy, or no services at all. There have been no studies that have systematically evaluated the

comparative effectiveness of pharmacological treatment for DBDs to other behavioral or psychosocial interventions. Previous research has indicated significant risks associated with pharmacological treatment that may be absent in non-pharmacological treatments.⁴²

Though total prescription drug payments increased from 2006 to 2008, per beneficiary per year prescription drug and psychotherapeutic drug payments decreased slightly from 2008 to 2009. Prescription prevalence and costs for psychotherapeutic drugs also peaked in 2008. Tables 2, 3, and 4 show this consistent trend, with the peak in 2008 among all subgroups and states. While trending increases could be masked by Medicaid managed care enrollment increases and/or incomplete encounter data from MCOs, the findings may indicate true savings in Medicaid drug spending, as there were more Medicaid pharmacy MCO carve-ins in states after 2008.⁴⁸ In other words, in 2009, more prescription claims were covered by MCO benefit plans that provide both medical and prescription drug benefits instead of carving-out pharmacy benefits to be covered by a separate state FFS program. The effects of carve-out versus carve-in policies can be further tested when new Medicaid administrative data (2010 and after) becomes available, though some recent reports already show cost-savings associated with the increase in state carve-in adoptions.⁴⁹ It is also possible that patent expirations led to more use of generic drugs, which would lower overall costs.

Unlike studies from national surveys that use sampling to investigate DBDs and other mental health conditions in children, this study utilizes Medicaid health administrative claims to examine population-based disease prevalence, prescription drug use, and cost patterns in pediatric beneficiaries. These administrative records are a unique information resource to investigate DBDs in Medicaid-enrolled children because innovative methods applied to this dataset avoid the analytical biases associated with sampling errors. As the Affordable Care Act has been implemented (including Medicaid expansion in many states) and Medicaid program data and information systems evolve, parallel methodologies can be used with this additional information to further the study of mental and behavioral health conditions in children.

Some limitations in this study affect the generalizability and application of its research findings. Some contextual factors, such as the recession that began in 2008, can affect children's DBD trajectories. Although it cannot be tested in this study, considering the impacts of economic trends and other contexts could be an avenue for further research. Total payments for prescriptions and for psychotherapeutic drugs in Medicaid programs may be underestimated because of incomplete encounter data in MCO plans and state CHIP (S-CHIP) plans that do not receive federal matching dollars. Thus, absolute numbers may not be entirely accurate, and results must be used with caution in drawing national-level conclusions.

Additionally, using medical claims data as a measurement of disease prevalence may result in some bias, as DBD diagnosis and coding variations among practitioners and states can lead to errors in calculating the number of children affected. The one-claim criterion, in contrast to more conservative inclusion criteria, could result in overestimation. On the other hand, some studies indicate the claims-based algorithm has limitations that underestimate conditions associated with less frequent healthcare encounters.⁵⁰ This potential underestimation combined with missing encounter data may explain the low prevalence of DBDs in the study in comparison with the prevalence of ADHD alone in the overall population. Finally, the study reports all-cause cost without differentiating by service type, which could bias estimates of prescription spending, especially for vulnerable subgroups, such as Medicaid-covered children in foster care.

Implications for Behavioral Health

Whether because of greater incidence, better diagnosis, or both, the number and proportion of children treated for DBDs is growing, thereby increasing the need for comprehensive pediatric psychiatric, psychological, and physical healthcare. Collectively, as the largest insurance provider for children in the USA, state Medicaid programs face challenges in providing effective and appropriate

care. Some children do not receive medication treatment at all; others may not receive the full spectrum of both medication and behavioral health services needed to manage DBDs effectively. Given the shortage of child psychiatrists nationally, and particularly the shortage of those who accept Medicaid reimbursement,⁵¹ many children may be receiving treatment from practitioners who lack sufficient expertise to manage drug therapy effectively, especially for complex cases.⁵² Medications may be overprescribed when concurrent behavioral health therapies are not available or are underutilized.

While imperfect, Medicaid administrative claims data allow detection of patterns regarding diagnosis prevalence and prescription drug use. The high proportion of psychotherapeutic drug use and costs related to DBD treatment is of special concern if drugs are prescribed inappropriately or in lieu of other services, especially for younger children. Given the expanding population of children with DBDs enrolled in Medicaid and CHIP programs, the high use of prescription medications in this population, and the likelihood of both over-treatment and under-treatment, expanding the capacity of trained health practitioners could aid in more effective and efficient care. Clinically, while there is not an exact benchmark standard to follow, relative standardized protocols including practices and training for health practitioners other than psychiatrists, such as advance practice nurses, pediatricians, and family practice physicians, could improve care as well. In integrated care settings, access to consultation with mental health professionals may also assist in expanding appropriate care for children and adolescents.

Given the long-term negative effects associated with DBDs that are not treated appropriately, this research warrants further investigation of DBD treatment. Information accessed from Medicaid administrative data sources is limited to use prevalence and Medicaid payments for psychotherapeutic drugs. DBD diagnosis and psychotherapeutic drug prescriptions are rising, but information about prescription appropriateness and access to recommended behavioral health services, such as talk therapy or parental interventions, is not available. Previous research has indicated that behavioral interventions may generally be more effective than pharmacological treatment.⁴² Given the shortage of pediatric mental health resources and Medicaid's expanding enrollment, needs are ever pressing to ensure access to appropriate treatment for diagnosed DBDs.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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