

Growth and Distribution of Child Psychiatrists in the United States: 2007–2016

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abstract

BACKGROUND: Historically, there has been a shortage of child psychiatrists in the United States, undermining access to care. This study updated trends in the growth and distribution of child psychiatrists over the past decade.

METHODS: Data from the Area Health Resource Files were used to compare the number of child psychiatrists per 100 000 children ages 0 to 19 between 2007 and 2016 by state and county. We also examined sociodemographic characteristics associated with the density of child psychiatrists at the county level over this period using negative binomial multivariable models.

RESULTS: From 2007 to 2016, the number of child psychiatrists in the United States increased from 6590 to 7991, a 21.3% gain. The number of child psychiatrists per 100 000 children also grew from 8.01 to 9.75, connoting a 21.7% increase. County- and state-level growth varied widely, with 6 states observing a decline in the ratio of child psychiatrists (ID, IN, KS, ND, SC, and SD) and 6 states increasing by >50% (AK, AR, NH, NV, OK, and RI). Seventy percent of counties had no child psychiatrists in both 2007 and 2016. Child psychiatrists were significantly more likely to practice in high-income counties ($P < .001$), counties with higher levels of postsecondary education ($P < .001$), and metropolitan counties compared with those adjacent to metropolitan regions ($P < .05$).

CONCLUSIONS: Despite the increased ratio of child psychiatrists per 100 000 children in the United States over the past decade, there remains a dearth of child psychiatrists, particularly in parts of the United States with lower levels of income and education.



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Dr McBain helped conceptualize and design the study and identify, evaluate, and interpret the data and led the drafting and revision of the manuscript; Mr Kofner generated figures and helped evaluate and interpret the data and write and review the manuscript; Drs Stein and Cantor helped conceptualized the study, interpreted the data, and assisted in the writing and review of the manuscript; Dr Vogt helped analyze and interpret the data and assisted in the review and writing of the manuscript; Dr Yu obtained funding support for the study, led the conceptualization of the study, helped interpret the data, and shared in writing and reviewing the manuscript; and all authors approved the final manuscript as submitted.

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WHAT'S KNOWN ON THIS SUBJECT: More than half of the children in the United States with a treatable mental health disorder do not receive treatment from a mental health professional. One of the driving factors contributing to this unmet need is a shortage in child psychiatrists.

WHAT THIS STUDY ADDS: We found that child psychiatrists (per 100 000 children) increased by 22% from 2007 to 2016. However, 70% of US counties had no child psychiatrists in 2007 or 2016, and child psychiatrists were much less prevalent in low-income and less-educated communities.

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More than half of the children in the United States with a treatable mental health disorder do not receive treatment from a mental health professional.¹⁻³ One of the driving factors contributing to this unmet need is a shortage in child psychiatrists, which is compounded by growing demand for treatment that places additional pressure on a limited supply of providers.⁴ Improved screening and diagnostic tools for childhood mental disorders,⁵ expanded child health insurance coverage,^{6,7} and greater caregiver awareness of pediatric mental health conditions all contribute to this increased demand. As a result, access to mental health care for children has been highly variable across states and counties.⁸

Historically, the shortage of child psychiatrists has been most acute among disadvantaged populations, such as racial and ethnic minority youth,⁹ as well as youth living in impoverished and rural areas.^{8,10} The American Academy of Child and Adolescent Psychiatry estimates, for example, that Rhode Island has >6 times as many child psychiatrists per capita as Wyoming does.¹¹ To attract physicians to rural and remote communities, mechanisms like the Health Resources and Services Administration's National Health Service Corps (NHSC) Loan Repayment Program have offered financial incentives for child psychiatrists and other physicians to serve in designated health professional shortage areas.¹² However, as little as 13% of physicians who participate in loan forgiveness programs select the NHSC over alternatives.^{13,14} As such, it remains unclear whether and to what extent recent policies and programs such as the NHSC's have improved access to child psychiatrists in underserved communities throughout the United States. Moreover, although there has been an overall increase in the number of

mental health providers in the United States, the current literature does not provide specifics on the growth in the number of child psychiatrists over the past decade and where the growth has occurred.

To provide an assessment of national trends in the growth and distribution of child psychiatrists in the United States, we examined the ratio of child psychiatrists per 100 000 children throughout all US counties for the most recent 10-year period data were available: 2007–2016. This information extends an earlier study of child psychiatrist levels in the United States completed in 2006.¹⁵ Separately, we examined the relationship between county-level sociodemographic characteristics and child psychiatrist workforce supply to identify characteristics associated with greater access to services over this period.

METHODS

Study Design

This retrospective time-series analysis of all 50 US states employed repeated cross-sectional data from 2007 to 2016 based on the 5 data sources described below. Data were aggregated at the county level based on US county Federal Information Processing Standard codes.¹⁶ The research was deemed exempt from review by Dr McBain's institutional review board.

Data Sources

Child Psychiatrists

The Area Health Resource Files (AHRF) of the Department of Health and Human Services maintains a county-level inventory of health professionals, including the number of child psychiatrists, on an annual basis. These data draw from the American Medical Association (AMA) Physician Masterfile,¹⁷ for which physicians (including child psychiatrists) report their primary location of practice, including

outpatient facilities and hospitals. More specifically, our analyses comprised licensed physicians who have met educational and credentialing requirements to practice as child psychiatrists, including doctors of medicine and doctors of osteopathy. Resident physicians are included. Historically, the AMA Physician Masterfile has been considered to maintain high completeness, with only a small proportion of licensed physicians being labeled "missing," largely because of how the AMA and state licensing agencies update their files.¹⁸

Children

Counts of youth ages 0 to 19 were obtained from the Census of Population and Housing, which is prepared by the US Census Bureau.¹⁹ Additionally, the US Census Bureau reports on population density, which is measured as the total population relative to land area in square miles.

County Characteristics

The AHRF contains a repository of county characteristics, elements of which were selected on the basis of Penchansky and Thomas's²⁰ canonical framework for considering determinants of access. First, we included rural-urban continuum codes, which classify counties according to population size and degree of isolation.²¹ We consolidated this measure into 5 commonly used levels²²⁻²⁴ that reflect population size and proximity to metropolitan areas: counties in metropolitan areas (levels 1, 2, and 3), urban counties adjacent to metropolitan areas (levels 4 and 6), urban counties not adjacent to metropolitan areas (levels 5 and 7), rural counties adjacent to metropolitan areas (level 8), and rural counties not adjacent to metropolitan areas (level 9).

A second set of AHRF county characteristics comprises socioeconomic measures. Here, we extracted measures of income,

education, and employment. The first, median income per capita at the county level unadjusted for inflation, was derived from the US Department of Commerce.²⁵ The second, percentage of adults by county with 4 or more years of college education, was obtained from the US Census Bureau, drawing from the American Community Survey.¹⁹ Lastly, percentage unemployment among adults ages 16 and older was extracted from the US Bureau of Labor Statistics Current Population Survey.²⁶

A third set of measures from the US Census Bureau quantified the racial and/or ethnic composition of counties. This was represented according to 3 categories: percentage non-Hispanic African American, other non-Hispanic, and Hispanic.¹⁹ Lastly, we used Small Area Health Insurance Estimates files from the US Census Bureau to measure the percentage of individuals <65 years of age in each county without public or private health insurance coverage²⁷ as well as the county-level average malpractice insurance premium for internal medicine physicians based on data from the Medical Liability Monitor.²⁸

Data Analysis

After inspecting measures of central tendency and dispersion,²⁹ we made 3 adjustments to account for nonlinearity in measures. First, to address the right skew of county-level median income per capita, we segmented income into quartiles. Second, to account for nonlinearity in the growth of child psychiatrists over time, we constructed year variables (1 for each year) and included all of them in the analysis except 2007, which was used as the reference. Third, based on the right skew of population characteristics, we performed log transformations of child population and population density and introduced a square-of-log term for child population.

We next estimated a multivariable negative binomial regression model with state-level fixed effects. The negative binomial distribution was selected over 0-inflated Poisson because the former more accurately accounted for overdispersion in the data based on the Pearson χ^2 dispersion statistic.³⁰ Fixed effects were entered for each state to address the potential of omitted variable bias, such as state-level policies that might influence workforce supply, by removing state-specific variance components.³¹ SEs were clustered at the state level to account for within-cluster correlation.

We included the following covariates in the negative binomial model: time (year), child population at the county level, urbanicity as connoted by rural-urban continuum code categories, county-level socioeconomic variables (income, education, and employment characteristics), and county-level racial and/or ethnic composition. To aid the interpretation of results, we computed predicted counts using Stata's margins command (Stata Corp, College Station, TX).³² Predicted counts quantified the number of child psychiatrists in a county on the basis of fitted models calculated with covariates specified at median values for the subgroup of interest. All tests were 2 sided, used an α level of .05, and were conducted in Stata version 15.0.

RESULTS

Child Psychiatrists per 100 000 Population

Between 2007 and 2016, the number of practicing child psychiatrists in the United States increased from 6590 to 7991: a 21.3% gain. Over this same time period, the number of children in the United States ages 0 to 19 modestly declined, from 82.22 million to 81.95 million. As such, the ratio of child psychiatrists grew from 8.01 child psychiatrists per 100 000 children in 2007 to 9.75 child

psychiatrists per 100 000 children in 2016. These trends are reflected in Fig 1.

The state-level growth of child psychiatrists varied widely. In 2007, 10 states had <5 child psychiatrists per 100 000 children compared with only 5 states in 2016 (Table 1). Meanwhile, the number of states with 10 or more child psychiatrists per 100 000 children increased from 11 to 14. Child psychiatrists per 100 000 children increased by >50% in 6 states (AK, AR, NV, NH, OK, and RI). Conversely, the ratio of child psychiatrists per 100 000 children declined in 6 other states: Idaho, Indiana, Kansas, North Dakota, South Dakota, and South Carolina. In several cases, this was due to faster growth in child population than in child psychiatrists (eg, KS), whereas in others, this reflected an absolute decline in child psychiatrists (eg, ND).

A preponderance of all US counties (76%) experienced no change in the level of child psychiatrists between 2007 and 2016, as illustrated by Fig 2, which is largely a function of the 70% of counties that contained 0 child psychiatrists in both 2007 and 2016. Among the remaining counties, the degree of change in the density of child psychiatrists from 2007 to 2016 was substantial. Within states such as California, Florida, and Massachusetts, an increase in child psychiatrists per 100 000 children in specific counties corresponded with declining levels in neighboring counties.

Distribution by Urbanicity

Compared with the ratio of child psychiatrists per 100 000 children in metropolitan areas from 2007 to 2016, there were fewer child psychiatrists in urban counties adjacent to metropolitan areas ($P = .02$) as well as rural counties adjacent to metropolitan counties ($P = .01$). There was not a statistically significant difference in the ratio of child psychiatrists per 100 000

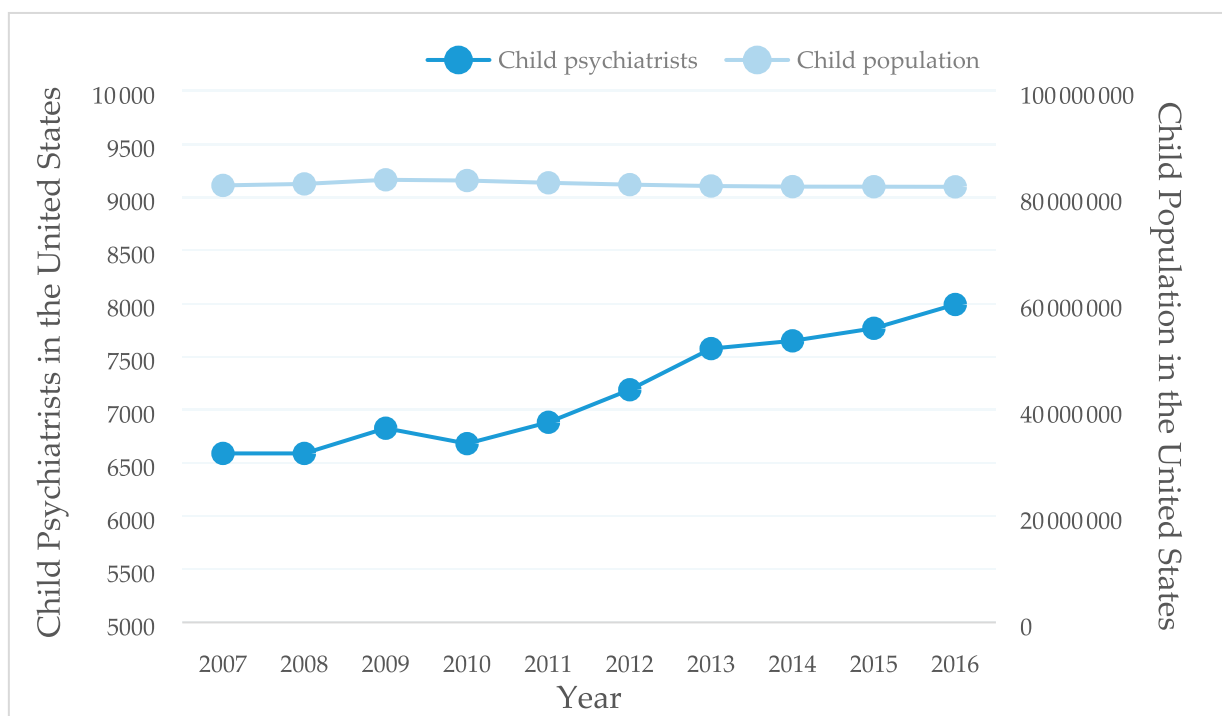


FIGURE 1

Child psychiatrists and children ages 0 to 19 in the United States (2007–2016). Y-axis 1 (right-hand side) signifies the number of child psychiatrists in the United States for each year from 2007 to 2016, whereas y-axis 2 (left-hand side) signifies the number of children ages 0 to 19 in the United States over this period.

children between metropolitan areas and urban areas nonadjacent to metropolitan areas and, separately, between metropolitan areas and rural counties nonadjacent to metropolitan areas ($P > .05$).

Distribution by Sociodemographic Characteristics

Child psychiatrists were significantly more likely to practice in higher-income-quartile counties (fourth versus first income quartile; $P < .001$), with 74% of child psychiatrists residing in top-income-quartile counties and 92% in the top-2-income-quartile counties, between 2007 and 2016. As of 2016, the expected number of child psychiatrists per 100 000 children in lowest-income-quartile counties was 1.40 compared with 5.04 in the highest-quartile counties: more than a threefold difference (Table 2). An even more stark contrast was observed for education level of the county. Counties in the fifth percentile

for completion of postsecondary education would be expected to have 1.10 child psychiatrists compared with 9.79 in the 95th percentile ($P < .001$). We observed no statistically significant relationship between county-level unemployment and the number of child psychiatrists ($P > .05$), although counties with lower levels of employment did on average have fewer child psychiatrists (Table 2). We further found no significant relationship between the density of child psychiatrists and percentage of individuals without public or private health insurance ($P > .05$) or between the density of child psychiatrists and average insurance premium for physicians in the county ($P > .05$).

There was a slightly larger ratio of child psychiatrists per 100 000 children in counties with larger non-Hispanic African American populations when adjusting for child population and all other

sociodemographic characteristics ($P < .001$). There was no such evidence that child psychiatrists were more abundant in counties with larger Hispanic populations ($P > .05$) or in counties with larger percentages of individuals who self-identified as non-Hispanic other ($P > .05$). Supplemental Table 3 provides an overview of all results from the regression analysis.

DISCUSSION

This analysis provides a timely update on the level and distribution of child psychiatrists in the United States over the past decade. Although the density of child psychiatrists has increased from 2007 to 2016, there remain ~70% of counties in the United States with no child psychiatrists. The distribution of child psychiatrists also remains inequitable, with a state like Massachusetts having as many child psychiatrists as Oklahoma, Indiana,

TABLE 1 Child Psychiatrists in the United States (2007 vs 2016)

State	2007			2016			Percent Change			
	Child Population		Child Psychiatrists	Child Population		Child Psychiatrists	Child Population		Child Psychiatrists	
	Total	Rate	Total	Rate	Total	Rate	Total	Rate		
Alabama	1 251 776	5.5	69	5.5	1 223 109	6.6	81	6.6	17.4	20.1
Alaska	197 703	5.1	10	5.1	201 614	9.9	20	9.9	100.0	96.1 ^a
Arizona	1 833 847	5.4	99	5.4	1 819 004	6.3	115	6.3	16.2	17.1
Arkansas	777 002	4.6	36	4.6	783 451	7.3	57	7.3	58.3	57.0 ^a
California	10 487 746	7.7	809	7.7	10 129 459	11.7	1002	9.9	23.9	28.2
Colorado	1 314 762	10.3	136	10.3	1 404 877	11.7	164	11.7	20.6	12.9
Connecticut	919 657	17.2	158	17.2	857 498	25.3	217	25.3	37.3	47.3
Delaware	231 302	7.3	17	7.3	229 392	9.2	21	9.2	23.5	24.6
Florida	4 489 589	5.9	267	5.9	4 612 753	7.8	359	7.8	34.5	30.9
Georgia	2 788 367	4.6	129	4.6	2 791 134	5.8	163	5.8	26.4	26.2
Hawaii	317 588	17.3	55	17.3	339 037	18.6	63	18.6	14.5	7.3
Idaho	450 317	3.3	15	3.3	481 885	3.3	16	3.3	7.0	-0.3 ^b
Illinois	3 574 275	6.2	223	6.2	3 256 545	8.4	272	8.4	22.0	33.9
Indiana	1 762 882	4.9	87	4.9	1 757 412	4.0	70	4.0	-19.5	-19.3 ^b
Iowa	800 818	5.0	40	5.0	822 142	5.2	43	5.2	7.5	4.7
Kansas	777 148	7.2	56	7.2	795 569	7.2	57	7.2	1.8	-0.6 ^b
Kentucky	1 110 344	7.1	79	7.1	1 124 893	7.9	89	7.9	12.7	11.2
Louisiana	1 211 660	4.9	59	4.9	1 229 555	7.4	74	6.0	25.4	23.6
Maine	313 521	14.7	46	14.7	287 787	16.3	47	16.3	2.2	11.3
Maryland	1 520 036	16.2	246	16.2	1 503 031	18.8	283	18.8	15.0	16.3
Massachusetts	1 621 137	20.5	333	20.5	1 584 016	26.5	420	26.5	26.1	29.1
Michigan	2 734 750	6.5	177	6.5	2 459 552	7.9	194	7.9	9.6	21.9
Minnesota	1 406 836	6.6	93	6.6	1 428 901	8.0	114	8.0	22.6	20.7
Mississippi	856 700	3.3	28	3.3	804 073	4.5	36	4.5	28.6	37.0
Missouri	1 583 410	6.4	101	6.4	1 543 666	8.0	123	8.0	21.8	24.9
Montana	245 161	5.3	13	5.3	253 503	7.1	18	7.1	3.4	33.9
Nebraska	498 642	6.6	33	6.6	526 284	8.0	42	8.0	27.3	20.6
Nevada	715 156	3.5	25	3.5	741 723	5.3	39	5.3	56.0	50.4 ^a
New Hampshire	334 516	9.6	32	9.6	297 413	16.5	49	16.5	53.1	72.2 ^a
New Jersey	2 288 504	9.7	222	9.7	2 201 976	12.5	276	12.5	24.3	29.2
New Mexico	558 558	8.1	45	8.1	545 258	10.1	55	10.1	22.2	25.2
New York	4 994 163	16.7	834	16.7	4 693 711	20.0	941	20.0	12.8	20.1
North Carolina	2 462 736	7.9	194	7.9	2 568 891	9.7	250	9.7	28.9	23.5
North Dakota	165 743	10.3	17	10.3	198 855	8.0	16	8.0	-5.9	-21.6 ^b
Ohio	3 064 656	7.1	217	7.1	2 916 458	8.4	245	8.4	12.9	18.6
Oklahoma	998 488	3.1	31	3.1	1 065 347	4.8	51	4.8	64.5	54.2 ^a
Oregon	956 460	8.4	80	8.4	966 539	11.4	110	11.4	37.5	36.1
Pennsylvania	3 155 295	10.3	324	10.3	3 020 991	12.2	368	12.2	13.6	18.6
Rhode Island	269 314	14.9	40	14.9	243 505	26.3	64	26.3	60.0	77.0 ^a
South Carolina	1 188 713	9.4	112	9.4	1 228 625	9.3	114	9.3	1.8	-1.5 ^b
South Dakota	219 891	7.7	17	7.7	236 526	7.6	18	7.6	5.9	-1.6 ^b
Tennessee	1 627 003	5.0	82	5.0	1 664 765	5.6	94	5.6	14.6	12.0
Texas	7 300 611	5.6	410	5.6	8 057 140	7.0	564	7.0	37.6	24.6

TABLE 1 Continued

State	2007			2016			Percent Change		
	Child Population		Child Psychiatrists	Child Population		Child Psychiatrists	Child Population		Child Psychiatrists
	Total	Rate	Total	Rate	Total	Rate	Total	Rate	
Utah	901 353	4.5	1 012 075	51	5.0	12.3	24.4	10.8	
Vermont	150 407	16.6	139 166	30	21.6	-7.5	20.0	29.7	
Virginia	2 041 450	8.7	2 092 529	204	9.7	2.5	14.6	11.8	
Washington	1 701 487	6.4	1 802 456	137	7.6	5.9	25.7	18.6	
West Virginia	434 287	5.1	419 018	28	6.7	-3.5	27.3	31.9	
Wisconsin	1 478 223	8.4	1 442 699	134	9.3	-2.4	8.1	10.7	
Wyoming	139 909	4.3	153 726	7	4.6	9.9	16.7	6.2	

^a Increase >50%.

^b Declining rate.

Georgia, Mississippi, and Tennessee combined, despite these latter states having 5 times as many children ages 0 to 19.

The shortage of child psychiatrists is consonant with previous findings,^{10,15,33} although we did find that the 1 child psychiatrist for every 12 477 children in 2007 increased to 1 child psychiatrist for every 10 256 children in 2016: a 21.7% improvement. This trend reflects an uptick in the number of child psychiatrists in the United States over this period, from 6590 to 7991, as well as a modest decline in the child population,³⁴ indicating overall improvement in potential access to care.

Despite the trend of more child psychiatrists over time, we also find that this growth is largely restricted to specific geographic areas of the United States and varies significantly at the state and county levels. At the state level, we observed a declining ratio of child psychiatrists per 100 000 children in 6 states (ID, IN, KS, ND, SD, and SC) and an annualized growth <2% in half of all US states. By contrast, 6 states observed a 50% or greater increase in the ratio of child psychiatrists per 100 000 children over this period (AK, AR, NV, NH, OK, and RI). These findings parallel trends in the distribution of mental health professionals in the United States generally⁸ as well as psychiatry as a discipline specifically.³⁵ Future research in this area should explore whether variable growth in the number of child psychiatrists is tied to specific legislative efforts at the national, state, and local levels.³⁶ Examinations at a local level would be particularly warranted in settings like California or Florida, where we found that growth in the number of child psychiatrists in many counties corresponded with declining numbers in adjacent counties.

One conspicuous factor shaping the distribution of child psychiatrists was, unsurprisingly, child population: although three-quarters of counties (74.7%) had no child psychiatrists in 2016, 80% of children in the United States reside in a county with at least 1 child psychiatrist. In other words, child psychiatrists are disproportionately located in counties with larger child populations, suggesting that the general allocation facilitates access to care. This observation is true more generally for the distribution of human resources for health in the United States. For example, Cummings et al⁸ found that mental health treatment resources in the United States are more heavily concentrated in urban areas, serving larger, more densely populated counties. However, 1 in 5 children still live in a county without a child psychiatrist, highlighting the ongoing challenge of providing children with local access to psychiatric services.

Similar to findings reported regarding primary care physicians,³⁷ counties with higher levels of education and higher incomes commonly had greater access to child psychiatrists. For example, a county in the 95th percentile of college graduates would be expected to have 9.8 times as many child psychiatrists as a county in the fifth percentile. A similar gradient was observed for income, with 3.6 times as many child psychiatrists expected in counties in the highest income quartile compared with counties in the bottom income quartile. A number of factors may contribute to these trends. For example, wealthier and more highly educated families may be more likely to seek mental health care and be able to pay cash or afford insurance copayments, deductibles, and out-of-pocket expenditures.³⁸ Affordability of child psychiatric services, as a conceptual feature of access to care,²⁰ is particularly problematic because many child psychiatrists do not accept Medicaid, a form of public

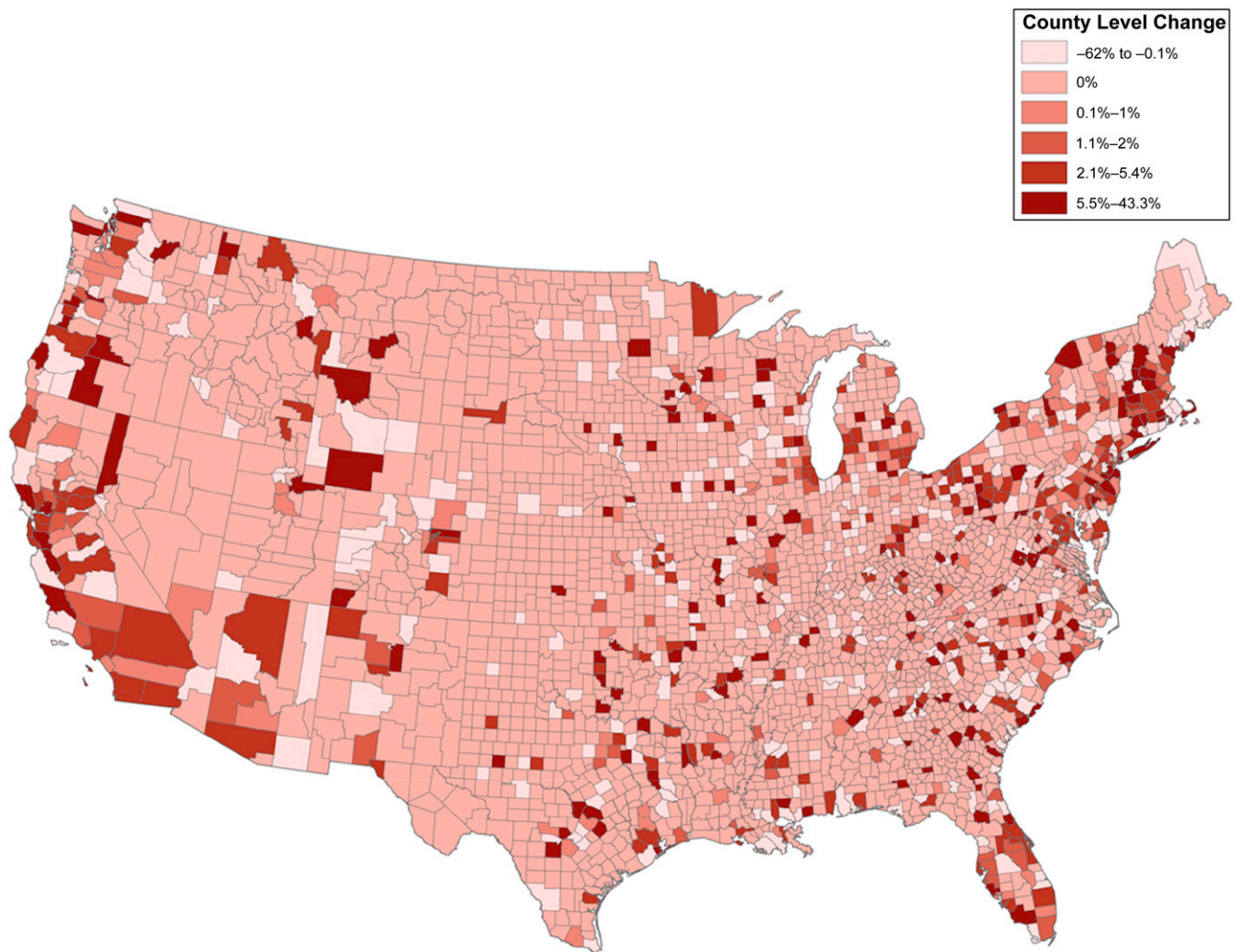


FIGURE 2
County-level change in child psychiatrists per 100 000 children (2007–2016).

health insurance that is the single largest payer for mental health services in the United States.³⁹

Additionally, we identified 2 sets of somewhat surprising results. First, urban and rural counties adjacent to metropolitan counties have proportionally fewer child psychiatrists. It is possible that access to care is more limited in metropolitan-adjacent counties because child psychiatrists relocate to affluent metropolitan communities with greater social amenities. Second, we observed a slightly greater density of child psychiatrists in counties with larger African American populations

after adjusting for all other factors. One possibility is that habitation in communities with a larger African American representation is merely a proxy for living in specific metropolitan neighborhoods, an observation that has been reported elsewhere.⁴⁰ If this were the case, examination of the distribution of child psychiatrists at the census-tract level could provide greater resolution on where child psychiatrists congregate within metropolitan regions. Unfortunately, these data are not available. This finding merits further investigation because the broader literature indicates wide-ranging patterns of access to and use

of mental health services among African American children and adolescents.^{41–43}

Several limitations should be noted. First, to identify year-on-year trends, population data were drawn from the US Census Bureau, which classifies children ages 0 to 19. This contrasts with previous studies that examined the age range of 0 to 17, preventing direct comparisons. Relatedly, the variable used for uninsured status examined individuals through age 65, not just children ages 0 to 19. Second, the large number of counties with 0 psychiatrists precluded our ability to examine interactions between time

TABLE 2 Expected Number of Child Psychiatrists per 100 000 Children by Characteristic

Characteristic	Expected Child Psychiatrists	Lower Bound	Upper Bound
Income quartile			
First (lowest)	1.40	1.01	1.79
Second	2.29	1.79	2.78
Third	3.53 ^a	2.88	4.17
Fourth (highest)	5.06 ^a	4.19	5.92
Education level, percentile			
Fifth	1.10	0.78	1.41
95th	10.77 ^a	9.71	11.84
Unemployment level, percentile			
Fifth	3.56	2.26	4.50
95th	1.19 ^a	0.81	1.58

^a Difference is significant at $P < .05$ compared with the reference group: first quartile or fifth percentile. Expected number of child psychiatrists based on fitted values from negative binomial models with year set to 2016, child population set to 100 000, and covariate characteristics set to median values within the county type of interest. Upper and lower bounds represent the fifth and 95th percentile estimates, respectively.

and county characteristics. It may be the case that, over a longer time horizon or by pooling child psychiatrists with other mental health professionals, these interactions could be studied at a broader level. Third, although our models included state-level fixed effects, other omitted variables may have been present at the county level. We attempted to account for this by a broad inclusion of covariates.

Lastly, we have no information about the offices that a child psychiatrist is practicing at nor individuals' level of engagement in the practice. Although the AMA Physician Masterfile is considered robust,⁴⁴ recent research has raised concern about the accuracy of address-level information.⁴⁵ As

such, we used the file to study child psychiatrist numbers at the county and state levels rather than at a more local level.⁴⁴ Level of active provider engagement could also shape unmet need. For example, a community with high levels of need for services might be undersupported if child psychiatrists practice infrequently. In this case, the AMA data would overestimate the availability of services. That said, it is also likely that such measures would be endogenous with the outcome of interest: namely, counties with more child psychiatrists could have a greater prevalence of child mental illness because diagnoses in these counties are more frequent due to the presence of child psychiatrists.

CONCLUSIONS

We find evidence that the supply of child psychiatrists in the United States has improved over the past 10 years but that a shortage is still profound in large segments of the country. Local and state policies have made efforts to address this through several mechanisms, such as student loan forgiveness programs and higher reimbursement rates, to promote equity in access to services.⁴⁶ However, our findings suggest that more structural community features, such as average wealth and education, are closely tied to the level of child psychiatrists; as such, broader policies that influence educational and economic opportunity may be required. Absent these, counties with few or no child psychiatrists may need to look to alternative or complementary frameworks to address child mental health needs, including integration of behavioral health in pediatric primary care settings,⁴⁷ school-based mental health services,⁴⁸ child psychiatry telephone consultation access programs,⁴⁹ and new models of telepsychiatry.⁵⁰

ABBREVIATIONS

AMA: American Medical Association

AHRF: Area Health Resource Files

NHSC: National Health Service Corps

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