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Emergency Department Use and Postvisit Care for Anxiety and Stress Disorders Among Children

A Population-Based Cohort Study in Alberta, Canada

Amanda S. Newton, PhD,* Rhonda J. Rosychuk, PhD,* Xiaoqing Niu, PhD,*
Ashley D. Radomski, MSc,* and Patrick J. McGrath, PhD†‡

Objective: We examined sociodemographic trends in emergency department ED visits and postvisit health care for anxiety and stress disorders.

Methods: Emergency department visits (N = 11,289) by children younger than 18 years were extracted from population-based administrative databases from Alberta, Canada (2002–2011). We examined health services use by demographics and socioeconomic proxy (First Nations status, family subsidy type: government, human services program, none). We calculated visit rates and described physician visits after discharge (n = 8075 children). Multivariable survival analyses (with 95% confidence intervals [CIs]) estimate time to first physician visit and ED return.

Results: During 2002–2011, visit rates increased by age, First Nations, and subsidy status. The largest increase was for children (all ages) from families receiving government subsidy (491.43/100,000, $P < 0.001$). Thirty days after an index visit, most physician follow-up visits were made by children aged 15 to 17 years (61.0%) and from families receiving no subsidy (66.5%). The median time to physician follow-up for First Nations children was 32 days (95% CI, 27–37) compared with 19 days for children from families receiving government subsidy whose median time was shortest (95% CI, 18–23). Children (all ages) in the government and human services program subsidy groups and those who had First Nations status returned earlier to the ED compared with children in the no subsidy group.

Conclusions: Adolescents had high ED use and physician follow-up, whereas First Nations children and those from families receiving subsidy (all ages) had high ED use and low physician follow-up. Efforts to improve disorder identification and treatment among high ED user groups and low physician follow-up user groups are needed.

Key Words: anxiety disorders, emergency service, hospital

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From the *Department of Pediatrics, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Alberta; †IWK Health Centre; and ‡Departments of Psychiatry, Pediatrics, and Community Health and Epidemiology, Dalhousie University, Halifax, Nova Scotia, Canada.

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Reprints: Amanda S. Newton, PhD, 3-526 Edmonton Clinic Health Academy, Department of Pediatrics, 11405-87 Ave, Edmonton, Alberta, Canada T6G 1C9 (e-mail: mandi.newton@ualberta.ca).

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In their lifetimes, approximately 1 in every 3 children younger than 18 years will meet criteria for an anxiety disorder.¹ Early onset anxiety disorders tend to follow a chronic course^{2,3} and involve recurrent episodes over time.⁴ These disorders are undertreated in children.^{5,6} This may result from the prominent somatic complaints that accompany the disorders (ie, stomach aches, headaches) diverting physician care,^{7,8} a tendency by children in adolescent years to not seek professional help,⁹ marked health care system deficits (with <1 in 5 receiving specialized mental health care),^{10,11} and/or personal and parental preferences for informal and general sources of help over specialist mental health services.¹²

Left undertreated, children with anxiety disorders are vulnerable to mental health deterioration, such that anxiety- and stress-based crises are among the most frequent reasons for emergency department (ED) mental health visits in the United States and Canada.^{13,14} In this sense, EDs serve as a safety net for those in need.¹⁵ Published national data indicate that from 1993 to 1999, 1 in every 6 mental health visits made by children to EDs in the US were for anxiety disorders, second only to visits for substance use disorders (1 in 4 visits).¹³ This trend has been reflected in more recent Canadian data, which have also pointed to a marked increase in the number of visits for anxiety and stress disorders (up to 12% between 2002 and 2006).¹⁴ One Canadian study has also indicated that 7% of children will return to the ED within 30 days of their anxiety-related visit for further care.¹⁶ Marked racial, ethnic, and sociodemographic disparities are reflected in rates of ED use (including return visits) for mental health care and access to community-based mental health services^{17–20} but whether these disparities are prominent in those children with anxiety- and stress-related visits has not been explicitly investigated.

In the context of known deficits and barriers regarding the treatment of childhood anxiety disorders, there has been few study in this large ED-based mental health care population. Understanding current trends in ED visit use for anxiety and stress disorders and postvisit (postcrisis) health care utilization (both considered “downstream” health care use) may point to a need for more “upstream” identification and treatment efforts (ie, in primary care, schools) and the costs on the health care system if such efforts are not mobilized. Further, understanding the extent to which an anxious child's sociodemographics are associated with ED use and postvisit care can inform strategic efforts to support vulnerable subgroups of children with anxiety- and stress-based crises.

We conducted a 9-year population-based study in Alberta, Canada to (1) examine changes in annual ED visit rates for anxiety and stress disorders and (2) to describe physician follow-up visits and ED return visits after an index ED visit for an anxiety or stress disorder. Objectives were explored across a range of child sociodemographics. Owing to the factors associated with undertreatment, we hypothesized that a significant increase in ED visit rates would be observed during the study period. On the basis

of published racial, ethnic, and sociodemographic disparities, we also hypothesized that the number of index visits as well as return ED visits and physician follow-up visits for a 30-day postcrisis period would vary significantly by sociodemographics with First Nations children and those from families receiving subsidy making fewer physician follow-up visits and more return ED visits.

METHODS

Patient Population and Data Sources

This was a population-based cohort study of children (age, <18 years) treated in any ED in Alberta, Canada, between April 1, 2002, and March 31, 2011. Research ethics board approval was granted from the University of Alberta (Edmonton, Alberta). To identify the cohort, we used the Ambulatory Care Classification System (ACCS) database of Alberta Health.²¹ This database is included in Canadian Institute for Health Information reabstraction studies to ensure data integrity and quality.²²

Children included in our cohort had an assigned main ambulatory diagnostic code for an anxiety or stress disorder (*International Classification of Diseases* codes: F40.x, F41.x, F42.x, or F43.x) coded by nosologists.²³ This diagnosis reflects the main reason for the provision of emergency services. From the ACCS database, we also obtained information on ED visit acuity (triage level) using the Canadian Triage and Acuity Scale.^{24,25}

Ambulatory Care Classification System data were linked to a provincial registry file to obtain sociodemographic data (age, sex, First Nations status, health care premium subsidy status) and to the Alberta version of the Canadian Institute for Health Information Discharge Abstract Database to obtain start and end dates of hospital stays. Linkage to a physician claims file maintained by Alberta Health provided information regarding physician-based care provided during the study period. Nearly 100% of Alberta physicians submit billing claims to Alberta Health for reimbursement for services provided. We examined visits made by children to physicians in the 30-day period after their initial ED visit (the postcrisis period), which we termed physician follow-up visits. Visits were identified according to physician billing date in the physician claims file. Up to 3 diagnostic codes²⁶ were obtained for each follow-up visit. Physician billing data also indicated the type of practicing physician (general practitioner, pediatrician, psychiatrist, other) and the type of facility where the care was received (practitioner's office, community mental health services facility, hospital, other).

Sociodemographic Variables

Child Demographics

Age at the time of the index ED visit was categorized as 0 to 4, 5 to 9, 10 to 14, and 15 to 17 years. Sex was defined as male or female according to the provincial registry file.

Child Socioeconomics

Health care in Canada is government funded and financing is provided through personal and corporate income taxes. Some provinces secure additional financing through health care premiums, but such premiums are not required for health coverage and all Canadians have access to health care. In Alberta, an annual health care premium (Can \$1056) was charged to families during the majority of the study period (2002–2009). Many employers

covered this cost through employee benefits, and families with lower incomes or receiving social services were also eligible for subsidies to offset the cost of the premium.

Within the province's registry file, children are categorized according to 4 independent sociodemographic groups. The level of subsidy provided by the Alberta government to the child's family defined the first 3 groups. We used these groups in the study as a proxy for socioeconomic status. The 3 groups were as follows: (1) human services program recipient (a child whose family received income support and health benefits from the province because of insufficient resources to meet basic needs), (2) government-sponsored program subsidy recipient (a child whose family received partial or full subsidies for their health care insurance premium or received disability benefits), and (3) no subsidy support (a child whose family received no support from the government for health care premium costs because of sufficient income and resources). The fourth group was defined as the presence of a First Nations status on the basis of treaties between First Nations bands and the Canadian government.²⁷ This status meant that families did not have to pay health care insurance premiums irrespective of level of income or resources. Families self-identifying as First Nations would be nonstatus First Nations and would not be identified by this method.

Main Outcome Measures

The main outcomes were by child sociodemographics, ED and physician follow-up visits, and the time from the index ED visit to first physician follow-up visit and ED return for mental health care among children discharged at the index ED visit.

Statistical Analysis

Data were analyzed using S-Plus software (S-Plus 8.1.1 for Linux, TIBCO Software Inc, Palo Alto, Calif; 2008); a *P* value of less than 0.05 was considered statistically significant.

Emergency Department Visits

Visit rates per 100,000 population for each sex and age group were calculated for the 2003 and 2011 fiscal years and 95% confidence intervals (CIs) were obtained. We assessed the statistical significance of changes in visit rates during the study period using the 2-sample test for equality of proportions with continuity correction.

Postcrisis Health Services Use

A discharged data subset of index ED visits was created with 1 record per discharged child from April 1, 2002, to September 29, 2010 to capture postcrisis health care utilization information. If a child had more than 1 visit concluding in discharge during this time frame, 1 visit was randomly selected and included in the data subset, which allowed a focus on time to follow-up visits after a specific ED visit and removed any requirement to adjust for subject-specific correlation in the analyses.

Characteristics of physician follow-up visits after the index ED visit are summarized at 7-, 14-, and 30-day time intervals. The times from the index visit to the next ED visit and first physician follow-up visit for a 30-day period are displayed with Kaplan-Meier curves. The time to next ED visit and the time to first physician follow-up visit were censored at the study end date March 31, 2011, or the next ED visit, whichever came first.

Estimated median times (with 95% CIs) are reported and groups are compared using log-rank tests.

RESULTS

Emergency Department Visits

During the 9-year study period, 11,289 visits for anxiety and stress disorders (54.1% and 45.9% of visits, respectively) were made by 10,215 children to 104 EDs in Alberta. Of these visits, 64.9% were made by children from families who received no subsidy, 12.4% were made by First Nations children, and 15.7% and 7.1% were made by children from families who received government subsidy and human services program support, respectively.

Emergency department visit rates are provided in Table 1. Between 2002 and 2011, annual ED visit rates increased across most child sociodemographics. The largest increases were for males (41.71/100,000 children, 47.7% increase), children aged 10 to 14 years (105.10/100,000 children, 80.5% increase), and children from families who received government subsidy (491.43/100,000 children, 309.4% increase). Children aged 15 to 17 years also experienced a large rate increase (100.60/100,000 children, 27.8% increase). In 2010/2011, socioeconomic differences in ED visit rates were prominent among adolescents but not children (Fig. 1). Age- and sex-specific visit rates were highest for males and females aged 15 to 17 years ($P < 0.001$). First Nations children and children from families who received government subsidy had the highest rates among the socioeconomic groups (females: 1219.0 and 1848.6/100,000 children; males: 768.9 and 1342.3/100,000 children).

Postcrisis Health Services Use

Between April 1, 2002, and September 29, 2010, a total of 8075 children were discharged from the ED, forming our discharged subset. Within 72 hours, 2.7% of children in the discharge cohort returned to the ED for another mental health

emergency (95% CI, 2.3–3.1); this increased to 4.1% within 1 week of the initial ED visit (95% CI, 3.7–4.5). Trends in return visits to the ED across groups were more pronounced by 14 days after discharge (Fig. 2A). Children from families who received human services program support or government subsidy and those who had First Nations status returned earlier to the ED than children from families who received no subsidy ($P < 0.001$, <0.001 , and <0.001). There was no statistically significant difference between other pairs among different socioeconomic groups.

Postcrisis visits to a physician increased steadily after the index visit (Table 2, Fig. 2B). Seven days after an index ED visit, 30.2% (2437/8075) of children had a follow-up visit with a physician. Among these children, most visits were for mental health concerns (63.0%) and made to general practitioners (44.1%). Of the children in the discharged subset, 985 (12.2%) were First Nations, 1248 (15.5%) were from families who received government subsidy, 535 (6.6%) were from families who received human services program support, and 5307 (65.7%) were from families who did not receive a subsidy. First Nations children had disproportionately fewer follow-up visits after discharge from the ED compared with other children (Table 2). The median time to physician follow-up for First Nations children was 32 days (95% CI, 27–37), compared with 22 days for children receiving human services program support (95% CI, 16–26), 19 days for children from families who received government subsidy (95% CI, 18–23), and 23 days for children from families who received no subsidy (95% CI, 21–24; Fig. 2B).

DISCUSSION

We found significant sociodemographic disparities among children in the use of EDs for anxiety- and stress-related crises and in visits to physicians in the postcrisis period. These findings highlight a crisis-oriented pattern of care for anxiety and stress

TABLE 1. Emergency Department Visit Rates for Anxiety and Stress Disorders in Alberta by Child and Sociodemographic Characteristics

	ED Visits, n		ED Visits per 100,000 Population, n (95% CI)				Rate Difference (95% CI)	P*	
	2002/2003	2010/2011	2002/2003		2010/2011				
	Total ED visits	1041	1537	126.87	(119.16–134.57)	168.95			(160.51–177.39)
Visits by age group, y									
00–04	16	11	8.21	(4.19–12.23)	4.27	(1.75–6.79)	–3.94	(–9.14–1.26)	0.133
05–09	56	87	26.63	(19.66–33.61)	37.99	(30.01–45.97)	11.36	(0.30–22.41)	0.045
10–14	301	537	130.61	(115.86–145.36)	235.71	(215.79–255.62)	105.10	(79.88–130.31)	<0.001
15–17	668	902	361.24	(333.89–388.58)	461.84	(431.77–491.91)	100.60	(59.43–141.77)	<0.001
Visits by sex									
Female	673	934	168.21	(155.51–180.91)	210.78	(197.28–224.28)	42.57	(23.79–61.34)	<0.001
Male	368	603	87.52	(78.58–96.46)	129.23	(118.92–139.54)	41.71	(27.84–55.58)	<0.001
Visits by First Nations and subsidy status									
First Nations	131	173	263.49	(218.43–308.55)	345.59	(294.18–397.00)	82.10	(11.73–152.47)	0.022
No subsidy	684	1071	105.27	(97.39–113.16)	134.31	(126.27–142.35)	29.04	(17.64–40.44)	<0.001
Human services program recipient	69	134	310.15	(237.08–383.22)	354.34	(294.45–414.23)	44.18	(–53.86–142.23)	0.408
Government-sponsored program recipient	157	159	158.83	(134.00–183.65)	650.25	(549.51–751.00)	491.43	(385.12–597.73)	<0.001

*Tested for trend in rate difference.

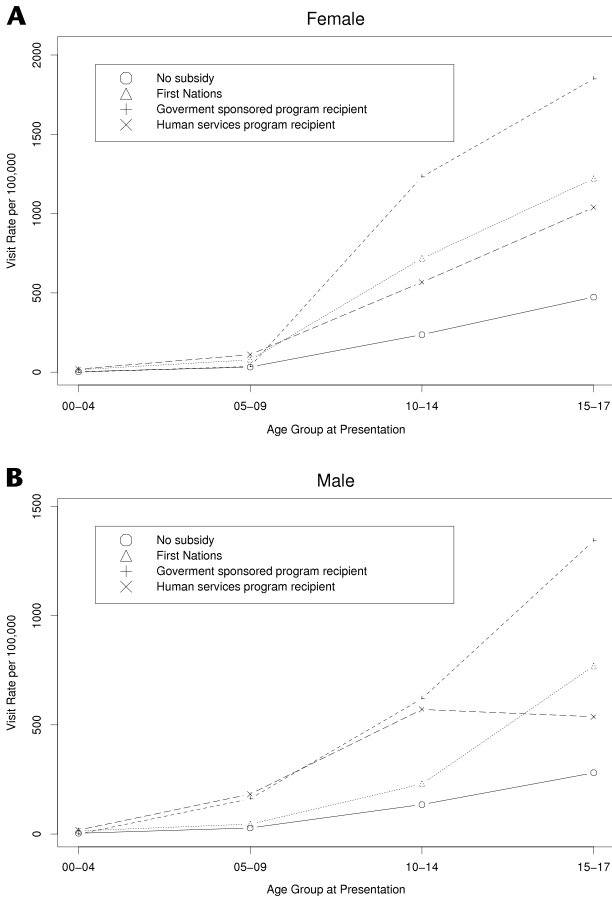


FIGURE 1. Age group and sex specific ED visit rates according to First Nations and subsidy status in 2010/2011.

disorders on the basis of sociodemographics and potential gaps in follow-up care, which may contribute to recurrent ED visits.

In this study, ED visit rate differences were evident across age groups. In 2010/2011, visit rates for the age of 10 to 14 years were 6-fold higher than the rates for the age of 5 to 9 years, and the rates for the age of 15 to 17 years were almost double the rates for the age of 10 to 14 years. Adolescents in our discharge cohort also represented most postcrisis follow-up visits at all time points in a 30-day period after the initial ED visit. Although these observations may reflect the higher prevalence of anxiety and stress disorders in the adolescent population, they may also signal a need for strategies in primary care settings and schools to promote early identification and treatment. Future research should examine how adolescents with anxiety and stress disorders are positioned in the health care and education systems to seek and receive mental health assessments and treatment and how these systems are organized to address anxiety disorders in particular. Future investigation of the care provided by physicians in follow-up mental health visits is also warranted as well as whether physician follow-up visits affect future use of the ED for mental health care. Such studies would help clarify the role and impact of physician-based care in the postcrisis period.

Socioeconomic differences were notable in this study: (1) ED visit rate increases were unprecedented for children from families receiving government subsidy, (2) children who were First Nations or from families that received a subsidy had higher visit rates than those from families that did not receive a subsidy, (3) differences in visit rates between the socioeconomic groups were more

pronounced among adolescents than children, and (4) children from families that received a subsidy returned earlier to the ED for further mental health care. In this study, we examined subsidies associated with health care premiums. Information regarding other Alberta government subsidies or programs for lower-income families was not available to us for review. An examination of these additional subsidies and programs, however, may reveal broader health and social services policy gaps that could be applied across multiple settings to increase mental health services availability for and utilization by families in need. If there are no mental health care services for families to access,^{28,29} delays for specialist care exist,³⁰ and/or direct and incidental costs and geographic barriers to receiving appropriate care are insurmountable for families,^{31,32} and government initiatives in Canada and programs such as Medicaid in the US designed to improve access to health care may be undermined in their potential to reduce costly downstream use of emergency health care services.

Multiple studies have shown that race and ethnic background influence access to mental health services and emergency care for children.^{17–20} In the postcrisis period, we found that First Nations children who had visited an ED for anxiety- or stress-based crises had disproportionately less follow-up care with a physician after an ED visit and longer times to follow-up care compared with other children. We currently have a poor

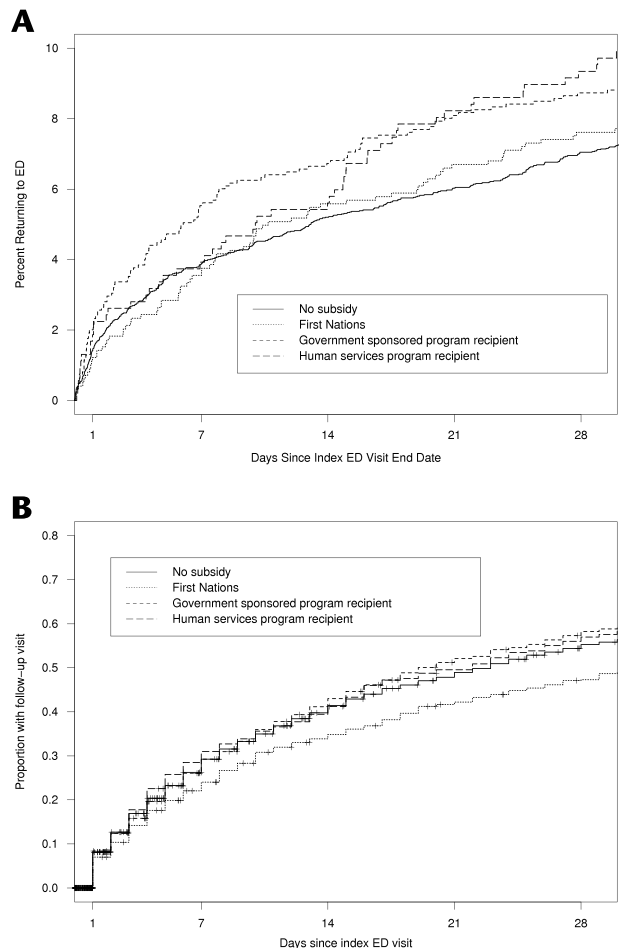


FIGURE 2. Time to return ED visit (A) and time to follow-up physician visit (B) after discharge, by First Nations and subsidy status.

TABLE 2. Postcrisis Follow-up Visits by Children to Physicians, n (column %; n = 8075)

	Days Since Index ED Visit		
	7	14	30
n (follow-up visits)	5366	9428	17,521
Age group, n (%), y			
00–04	50 (0.9)	102 (1.1)	185 (1.1)
05–09	277 (5.2)	465 (4.9)	875 (5.0)
10–14	1751 (32.6)	3067 (32.5)	5773 (32.9)
15–17	3288 (61.3)	5794 (61.5)	10,688 (61.0)
Sex, n (%)			
Female	3323 (61.9)	5870 (62.3)	10,878 (62.1)
Male	2043 (38.1)	3558 (37.7)	6643 (37.9)
First Nations and subsidy status, n (%)			
First Nations	478 (8.9)	825 (8.8)	1467 (8.4)
No subsidy	3628 (67.6)	6306 (66.9)	11,650 (66.5)
Human services program recipient	373 (7.0)	717 (7.6)	1461 (8.3)
Government sponsored program recipient	887 (16.5)	1580 (16.8)	2943 (16.8)
Reason for follow-up visit, n (%)			
Mental health concern	3382 (63.0)	5836 (61.9)	10,573 (60.3)
Other health concern	1704 (31.8)	3134 (33.2)%	6201 (35.4)
Missing	280 (5.2)	458 (4.9)	747 (4.3)
Physician providing follow-up visit, n (%)			
General practitioner	2368 (44.1)	3956 (42.0)	7090 (40.5)
Pediatrician	356 (6.6)	625 (6.6)	1144 (6.5)
Psychiatrist	1839 (34.3)	3473 (36.8)	6862 (39.2)
Other	803 (15.0)	1374 (14.6)	2425 (13.8)
Facility where follow-up visit took place, n (%)			
Active treatment hospital	2617 (48.8)	4682 (49.7)	8728 (49.8)
Mental health service facilities	141 (2.6)	231 (2.4)	460 (2.6)
Practitioner's office	2340 (43.6)	4040 (42.9)	7584 (43.3)
Other	268 (5.0)	475 (5.0)	749 (4.3)

understanding of the prevalence of anxiety and stress disorders among First Nations children with published reports and studies having focused on the prevalence of substance use, behavioural disorders, and deliberate self-harm.^{33–35} Our findings expose a group of vulnerable children who had high ED visit rates, low follow-up visit rates, and a longer time before visiting a physician in the postcrisis period. Marked racial disparities have also been noted among US Hispanic and non-Hispanic black adolescents for anxiety-based services compared with white adolescents even when the disorder was associated with severe impairment.¹⁰ These and our study's findings suggest that investments in culturally based, community- and school-based resources focused on proactively addressing stress and anxiety may help self-management of stressors, increase early parental recognition of worrisome symptoms, and reduce crisis events. Although such resources would not have been captured through physician billing in our study, the high rates of ED use suggest that if such services were being used, they may not have been specific

or comprehensive enough to reduce crises or other barriers exist for First Nations children who require identification.

Our study has several limitations. First, we were limited by diagnostic reporting. Although others indicate diagnostic accuracy in mental health-based studies using ACCS data,³⁶ no formal assessment of mental health diagnostic coding in ambulatory care has been conducted. Second, the databases used do not identify all Aboriginal children such as non-Treaty Status, Inuit and Métis children. Further, the provincial government has not actively captured information on First Nations status in the ACCS database since 2009/2010 when health care premiums were eliminated, and thus, our results likely underrepresent those children with First Nations status. Third, we could not determine the influence of contact with nonphysician resources in the postcrisis period or other variables hypothesized to influence the use of health care (ie, complementary and alternative medicine). Higher rates of visits to EDs in our study may reflect access or care quality issues with mental health services in the child's community. Child- or family-specific determinants (eg, stigma, family utilization preferences, unmet need) likely also further explain postcrisis health care use, but these were not available in the ACCS. Finally, although others have reported the same socioeconomic proxy definition,³⁷ our use of health care premium subsidy may not accurately reflect a child's broader socioeconomic status.

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