Medicaid Expenditures for Children Remaining at Home After a First Finding of Child Maltreatment

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abstract

BACKGROUND: Child maltreatment is associated with physical and mental health problems. The objective of this study was to compare Medicaid expenditures based on a first-time finding of child maltreatment by Child Protective Services (CPS).

METHODS: This retrospective cohort study included children aged 0 to 14 years enrolled in Utah Medicaid between January 2007 and December 2009. The exposed group included children enrolled in Medicaid during the month of a first-time CPS finding of maltreatment not resulting in out-of-home placement. The unexposed group included children enrolled in Medicaid in the same months without CPS involvement. Quantile regression was used to describe differences in average nonpharmacy Medicaid expenditures per child-year associated with a first-time CPS finding of maltreatment.

RESULTS: A total of 6593 exposed children and 39 181 unexposed children contributed 20 670 and 105 982 child-years to this analysis, respectively. In adjusted quantile regression, exposed children at the 50th percentile of health care spending had annual expenditures \$78 (95% confidence interval [CI], 65 to 90) higher than unexposed children. This difference increased to \$336 (95% CI, 283 to 389) and \$1038 (95% CI, 812 to 1264) at the 75th and 90th percentiles of health care spending. Differences were higher among older children, children with mental health diagnoses, and children with repeated episodes of CPS involvement; differences were lower among children with severe chronic health conditions.

CONCLUSIONS: Maltreatment is associated with increased health care expenditures, but these costs are not evenly distributed. Better understanding of the reasons for and outcomes associated with differences in health care costs for children with a history of maltreatment is needed.

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WHAT'S KNOWN ON THIS SUBJECT: Previous research describes higher health care expenditures for selected populations of children with a history of maltreatment, including those suffering severe abuse or those in foster care. Health care expenditures for the majority of Child Protective Services-involved children are not well understood.

WHAT THIS STUDY ADDS: Through linkage of state Medicaid and Child Protective Services databases, this study captures similarities and differences in health care expenditures based on a history of child maltreatment. Results may guide efforts to improve care for a high-risk population.

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Every year, ~1 in 100 children is identified by state Child Protective Services (CPS) as a victim of maltreatment.¹ More than 80% of these children will remain at home after maltreatment, often living with the same childhood adversities (eg, parental substance abuse, mental illness, and/or family and community violence) that first brought the child to CPS attention.^{2,3} Previous research has established a consistent, dose-dependent relationship between exposure to these adversities and long-term health problems, including high-risk health behaviors, physical illness, and emotional challenges.^{4–11} It is not surprising, therefore, that some children with a history of maltreatment incur higher health care costs.

There has been little research describing health care costs of CPS-involved children who remain in the home after maltreatment. Research that exists describes high costs of illness associated with severe physical abuse or high health care costs among CPS-involved children placed in foster care.^{12–16} These studies do not reflect the substantial majority of CPS-involved children. A single study describing Medicaid expenditures for a broader CPS population gathered data from a survey that oversampled children entering foster care and children receiving ongoing services after maltreatment, those children most likely to accrue high health care costs.^{17,18} We do not know whether children remaining at home after maltreatment have health care costs similar to children placed in foster care and whether children with ongoing CPS involvement differ from those with one-time contact. Finally, previous studies have not characterized the distribution of higher health care costs within the CPS-involved population. Health care costs are rarely distributed evenly across populations, and there is no reason to suspect that this scenario

is different for these children. Understanding which children are likely to accrue substantially higher health care costs (and which children are not) may inform policy and practice around efforts to improve health outcomes for children with a history of maltreatment.

The primary aim of the present study was to compare Medicaid expenditures for children remaining at home after a first-time CPS finding of maltreatment versus children with no CPS history of maltreatment, and to describe characteristics associated with observed differences in these expenditures. We hypothesized that health care expenditures for children remaining at home after a first finding of maltreatment would be higher than expenditures for children with no maltreatment history but that these differences would not be uniformly distributed across this population. We also hypothesized that differences in expenditures would be highest for children with severe chronic conditions, children with mental health conditions, and children with recurrent CPS involvement resulting in foster care placement.

METHODS

Design

This retrospective cohort study was approved by the institutional review boards for the University of Utah, the Utah Department of Human Services, and the Utah Department of Health (DOH).

Data Source

In collaboration with the Utah DOH and the Utah Division of Child and Family Services (DCFS), 2 statewide data sets were joined by a unique identifier (Fig 1). This unique identifier links citizens across state programs and is available for 85% to 90% of children in DCFS databases and 100% of children in Medicaid databases. For the present study,

DCFS identified 20 591 children aged 0 to 14 years with a first-time CPS finding of maltreatment between January 2007 and December 2009 with a unique identifier. A “finding” is a determination that maltreatment occurred based on a CPS investigation. DOH matched 18 713 (90.9%) of these children to the state Medicaid database.

For each child enrolled in Medicaid during the month of a first-time finding of maltreatment, 4 children aged 0 to 14 years were selected at random from the full Medicaid population in the same month to improve study efficiency. With exclusion of duplicate children, this approach provided a total of 52 661 children. Data related to demographic characteristics, Medicaid enrollment, and health care between 2007 and 2013 were drawn from the DOH database. The linked DCFS-DOH data for these 71 374 children defined the research database.

Participants

Our study cohort was identified from the research database (Fig 1). “Exposed children” were defined as Medicaid-enrolled children aged 0 to 14 years with a first-time CPS finding of maltreatment between January 2007 and December 2009 not resulting in out-of-home (foster) placement. From the 18 713 children with a first-time finding of maltreatment, 11 299 (60.4%) were not enrolled in Medicaid during the month of this first CPS finding. Of the remaining children, 821 (11.1%) were excluded due to foster care placement in the month after the first CPS finding. The remaining 6593 children defined the exposed children for this analysis. “Unexposed children” were defined as children 0 to 14 years of age enrolled in Medicaid at any time between January 2007 and December 2009 who had no history of CPS involvement. The 52 661 children selected at random from

FIGURE 1
Selection of study subjects from the research database. ID, identifier.

the Medicaid database were back-matched to the DCFS database. Of these, 13 480 (25.6%) had a history of CPS involvement between 1993 and 2013, leaving 39 181 unexposed children for the present analysis.

Time Frame

For each exposed child, a first-time CPS finding of maltreatment defined the point of study entry. For each unexposed child, a month between January 2007 and December 2009 during which the child was enrolled in Medicaid was selected at random as the point of study entry. Nonpharmacy Medicaid expenditures were calculated for each child for up to 4 years from study entry.

Outcomes

The primary outcome was the mean annual Medicaid expenditure per child-year for exposed and unexposed children during the study time frame. Total Medicaid expenditures were calculated for each year of Medicaid enrollment; annual expenditures were summed and averaged for the outcome. All expenditures were adjusted to 2012

US dollars by using the medical care component of the Consumer Price Index.

Exposure

The exposure of interest was a first-time CPS finding of maltreatment not resulting in an out-of-home placement.

Covariates

Medicaid expenditures were adjusted for child demographic characteristics, including child age, sex, race (white versus non-white), ethnicity (Hispanic versus non-Hispanic), months of Medicaid enrollment per year, and year of study entry. In our secondary analysis, selected covariates were used to stratify primary results, including severe chronic conditions, mental health conditions, and chronic maltreatment. A severe chronic condition was defined as either a Supplemental Security Income Medicaid enrollment classification for at least 50% of a child's study enrollment or an *International Classification of Diseases, Ninth Revision* (ICD-9), diagnosis associated

with a pediatric complex chronic condition.^{19,20} Mental health after maltreatment is an important contributor to health care costs.^{17,21,22} For this analysis, we included children with any mental health diagnosis during the study time frame using the mental health ICD-9 codes between 290.0 and 314.9. Finally, we compared exposed children remaining at home after just 1 CPS finding of maltreatment, those remaining at home with ≥ 2 CPS findings of maltreatment, and those with foster care placement during the study time frame to understand the association between chronic maltreatment and foster care placement and differences in Medicaid expenditures.

Statistical Analysis

Health care costs are characterized by excessive zeros and overdispersion, reflecting the many patients receiving no health care over a selected time frame and the few patients receiving repeated, prolonged, or high-cost health care during the same time frame.²³ This scenario results in a highly skewed

TABLE 1 Cohort Characteristics

Characteristic	Cohort	
	Exposed	Unexposed
Total no. of children	6593	39 181
Total no. of child-years	20 670	105 982
Months of Medicaid enrollment per year	10.2 ± 3.12	9.6 ± 3.52
Age, mean ± SD, y	4.8 ± 4.08	4.8 ± 3.94
Age, y		
0–1	2161 (32.8)	11 503 (29.4)
2–5	2217 (33.6)	15 069 (38.5)
6–10	1470 (22.3)	8509 (21.7)
11–14	745 (11.3)	4100 (10.5)
Sex		
Female	3208 (48.7)	18 829 (48.1)
Male	3385 (51.3)	20 352 (51.9)
Race		
American Indian	347 (5.3)	1263 (3.2)
Asian	82 (1.2)	702 (1.8)
Black	307 (4.7)	1278 (3.3)
Pacific Islander	76 (1.2)	675 (1.7)
White	5769 (87.5)	35 214 (89.9)
Other	12 (0.2)	49 (0.1)
Hispanic	1452 (22.0)	10 189 (26.0)
Severe chronic condition	422 (6.4)	2345 (6.0)
Mental health diagnosis ^a	592 (9.0)	2018 (5.2)
CPS involvement		
None	0	39 181 (100)
One CPS investigation	4274 (64.8)	0
Multiple CPS investigations	1431 (21.7)	0
Later foster care placement	888 (13.5)	0
Maltreatment type		
Psychological ^b	2931 (44.5)	0
Sexual abuse	456 (6.9)	
Physical abuse ^c	342 (5.2)	
Neglect	1758 (26.7)	
Other ^d	280 (4.2)	
Multiple allegations	826 (12.5)	

Unless otherwise indicated, data are presented as *n* (%).

^a Mental health diagnosis includes any ICD-9 code between 290.0 and 314.9.

^b Psychological maltreatment includes Utah definitions of Domestic Violence Related Child Abuse, mapped to this category according to federal standards.¹

^c Includes 156 children categorized as “physical abuse–severe” (2.4% of all exposed children).

^d Other maltreatment category includes fetal exposure/addiction to alcohol or other substance (*n* = 157), sibling/child at risk (*n* = 62), dependency (*n* = 45), dealing in material harmful to a child (*n* = 11), and pediatric condition falsification (*n* = 5).

distribution of costs, violating critical assumptions of traditional regression models.

To address this situation, a fully adjusted quantile regression model was used to estimate the difference in expenditures for children based on CPS history.^{24,25} Quantile regression conducts a multivariable regression at each quantile of the outcome of interest within the study population. Results reflect the adjusted difference in average annual Medicaid expenditures between children with and without a CPS finding of

maltreatment at a specified quantile of health care expenditures. We ran this quantile regression across the full cohort and then stratified this model across child age at study entry.

In the secondary analyses, a series of quantile regressions stratified across potential explanatory variables were used to examine characteristics associated with differences in Medicaid expenditures after a first-time finding of maltreatment. We ran subset analyses on children with a mental health condition, creating models that included and excluded

those encounters associated with any mental health diagnosis to compare how general care for children with mental health needs and specific care for mental health concerns influenced expenditures. A similar subset analysis was conducted on exposed children based on recurrent CPS involvement. Models including and excluding data after foster care placement were compared to understand how foster care–associated health care influenced expenditures.

RESULTS

Sample Description

During the 4 years of study enrollment, 6593 exposed children and 39 181 unexposed children contributed 20 670 and 105 982 child-years, respectively (Table 1). Exposed and unexposed children were similar in age (mean age, 4.8 years) and sex (51.3% vs 51.9% male). Exposed children were more likely to be of minority race (12.5% vs 10.1%) but less likely to be of Hispanic ethnicity (22.0% vs 26.0%). Exposed children had more months of Medicaid enrollment per child-year (10.2 vs 9.6 months/year). Psychological maltreatment and neglect were the most common maltreatment types identified.

A severe chronic condition was identified in 6.4% and 6.0% exposed and unexposed children, respectively. A mental health condition was noted in 9.0% of exposed children and 5.2% of unexposed children. Although the majority of exposed children had a single CPS finding of maltreatment, 35.2% had at least 1 additional finding of maltreatment, and 13.5% entered foster care at some point during the study.

Unadjusted Differences in Medicaid Expenditures Based on a First-time CPS Finding of Maltreatment

Mean annual Medicaid expenditures for the lowest 25th percentile of

TABLE 2 Unadjusted Differences in Mean Annual Medicaid Expenditures Associated With a First-time CPS Finding of Maltreatment Not Resulting in Out-of-Home Placement

Characteristic	Unadjusted Expenditures per Year, Mean (95% CI)		
	Exposed	Unexposed	Difference
Overall	1395 (1280 to 1510)	893 (832 to 954)	502 (372 to 632)
Child age at study entry, y ^a			
0–2	1772 (1528 to 2015)	1112 (977 to 1247)	660 (381 to 938)
3–5	841 (742 to 941)	586 (521 to 651)	255 (136 to 374)
6–10	1024 (796 to 1251)	752 (642 to 861)	272 (19 to 525)
11–14	2683 (2201 to 3164)	1699 (1408 to 1989)	984 (422 to 1546)
Sex ^a			
Female	1179 (1038 to 1320)	808 (727 to 888)	372 (210 to 534)
Male	1599 (1420 to 1779)	972 (881 to 1062)	628 (427 to 829)
Race ^a			
White	1221 (882 to 1559)	691 (605 to 776)	530 (181 to 879)
Minority	1420 (1298 to 1542)	916 (849 to 983)	504 (365 to 644)
Ethnicity ^a			
Hispanic	1129 (944 to 1315)	634 (574 to 693)	496 (301 to 690)
Non-Hispanic	1470 (1332 to 1608)	984 (905 to 1064)	486 (327 to 645)
Severe chronic condition ^b			
Present	6494 (5315 to 7673)	8070 (7139 to 9001)	–1576 (–3077 to –75)
Absent	1035 (951 to 1119)	426 (413 to 439)	609 (524 to 694)
Mental health diagnosis ^b			
Present	3616 (2971 to 4260)	2837 (2298 to 3375)	779 (–60 to 1618)
Absent	1176 (1068 to 1284)	787 (730 to 844)	389 (267 to 510)
CPS involvement ^b			
One CPS investigation	1091 (959 to 1223)	893 (832 to 954)	198 (53 to 344)
Multiple CPS investigations	1356 (1108 to 1604)	893 (832 to 954)	463 (208 to 718)
Later foster care placement	2920 (2527 to 3313)	893 (832 to 954)	2027 (1629 to 2425)
Maltreatment type			
Psychological	1001 (901 to 1102)	893 (832 to 954)	108 (–9 to 226)
Sexual abuse	239 (166 to 312) 1882 (1423 to 2340)	893 (832 to 954)	989 (526 to 1451)
Physical abuse	2539 (1873 to 3206)	893 (832 to 954)	1646 (977 to 2316)
Neglect	1257 (1108 to 1405)	893 (832 to 954)	364 (203 to 524)
Other	3895 (2970 to 4821)	893 (832 to 954)	3002 (2075 to 3930)
Multiple allegations	1606 (1328 to 1884)	893 (832 to 954)	713 (429 to 998)

Data are presented as mean (95% CI) in 2012 US dollars.

^a Included in multivariate model.

^b Used in stratification models.

children were zero, indicating that a substantial minority of publicly insured children, regardless of maltreatment history, were not routinely involved with the health care system. For exposed children, mean annual expenditures were higher than those of unexposed children over the 4 years after enrollment (Table 2). We identified no difference in the proportion of Medicaid expenditures associated with inpatient care among exposed (23.2%) and unexposed (23.3%) children.

On average, CPS history was associated with lower expenditures (\$6494 vs \$8070) for children with a

severe chronic condition but higher expenditures among children with a mental health condition (\$3616 vs \$2837). Although mean annual Medicaid expenditures were higher for all exposed children, these expenditures were significantly higher for those who had repeated CPS findings of maltreatment during the study time frame, particularly for those entering foster care (\$2920 vs \$893).

Adjusted Differences in Medicaid Expenditures Based on a First-time CPS Finding of Maltreatment

An adjusted quantile regression model described the distribution of differences in mean annual Medicaid

expenditures between exposed and unexposed children (Fig 2A). There was no difference in mean annual Medicaid expenditures in the lowest quartile of health care spending. At the 50th percentile of health care spending, Medicaid expenditures for exposed children were \$78 (95% confidence interval [CI], 65 to 90) higher than those of unexposed children. Above the 50th percentile, differences in costs between exposure groups increased. At the 75th and 90th percentiles, mean annual Medicaid expenditures for exposed children were \$336 (95% CI, 283 to 389) and \$1038 (95% CI, 812 to 1264) higher than for unexposed children, respectively. When

FIGURE 2

Adjusted difference in Medicaid expenditures per child-year based on a first-time CPS finding of maltreatment. (A) The solid line estimates the adjusted mean difference in annual Medicaid expenditures (y-axis) for children remaining at home after a first-time finding of maltreatment at each percentile of health expenditures (x-axis). Shading around this line captures the 95% CIs. The horizontal dashed line reflects the point estimate for the adjusted mean annual expenditures based on a similarly adjusted linear regression model. In the lower quartiles of health expenditures, there is little difference between children based on CPS history. Large differences in health expenditures based on CPS history are observed in the upper quartile of health expenditures. The analysis was adjusted for child age, child sex, race, ethnicity, months of Medicaid enrollment, and year of study entry. (B) Each line estimates the adjusted mean difference in annual Medicaid expenditures (y-axis) at deciles between the 50th and 90th percentiles of health spending based on age of a first-time CPS finding of maltreatment (x-axis). Large differences in health expenditures are noted among children aged 11 to 14 years at the time of study enrollment. The analysis was adjusted for child sex, race, ethnicity, months of Medicaid enrollment, and year of study entry. All expenditures are expressed in 2012 US dollars.

stratified across child age, differences in expenditures were concentrated among children aged 11 to 14 years at the time of study enrollment (Fig 2B).

Characteristics Associated With Differences in Mean Annual Medicaid Expenditures After a First-time CPS Finding of Maltreatment

This quantile regression was stratified over variables of interest to understand the higher Medicaid expenditures in exposed children (Fig 3, Supplemental Table 3). Although children with severe chronic conditions had higher annual Medicaid expenditures than their healthy peers, CPS history was not associated with these differences. In contrast, CPS history was associated with higher annual Medicaid expenditures for children with at least 1 mental health diagnosis. For children with a mental health condition, mean expenditures for exposed children were \$316 (95% CI, 176 to 457) and \$786 (95% CI, 313 to 1257) higher than unexposed children in the 50th and 75th percentiles, respectively. This difference persisted even when reimbursements for health encounters coded for a mental health diagnosis were excluded, reducing differences to \$224 (95% CI, 78 to 371) and \$549 (95% CI, 216 to 883) at the 50th and 75th percentiles. Finally, subsequent CPS involvement was associated with higher Medicaid expenditures.

Children remaining at home after only 1 CPS finding of maltreatment had expenditures of just \$27 (95% CI, 17 to 38) and \$97 (95% CI, 66 to 128) above children with no CPS history at the 50th and 75th percentiles. In comparison, the 22% of children remaining at home with multiple CPS findings had expenditures \$98 (95% CI, 62 to 133) and \$320 (95% CI, 221 to 418) higher at the 50th and 75th percentiles. The 13% of children who entered foster care

FIGURE 3

Adjusted difference in mean annual Medicaid expenditures per child-year based on selected characteristics after a first-time finding of maltreatment. Lines estimate the adjusted mean difference in annual health expenditures (y-axis) for children with different characteristics after a first-time finding of maltreatment not resulting in foster placement at each percentile of health expenditures

during the study had expenditures of \$971 (95% CI, 811 to 1132) and \$2243 (95% CI, 1918 to 2569) higher than unexposed children at the 50th and 75th percentiles. When children were excluded from the study from the point of placement in foster care, differences between children remaining in home after repeat CPS involvement and children placed in foster care resolved.

DISCUSSION

The present study found that children have, on average, higher annual Medicaid expenditures over 4 years after a first-time CPS finding of maltreatment not resulting in out-of-home placement. This finding is consistent with previous research describing high health care costs among children with a history of CPS involvement and among adults who recall a history of maltreatment.^{17,21,22} In contrast to previous research, which oversampled CPS-involved children most likely to have complex health care needs, we found that higher health care expenditures for most children were minimal after first-time CPS involvement. One-quarter of these CPS-involved children had no health care expenditures in the year after maltreatment, and another one-quarter had health care expenditures indistinguishable from CPS-uninvolved children. These findings suggest an untapped opportunity for child welfare and child health care to work together to assure that children receive appropriate preventive physical and mental health care after a first-time finding of maltreatment, with the goal of reducing the risk of chronic illnesses associated with a history of maltreatment. Our finding that health care expenditures among CPS-involved children with severe chronic conditions are similar to (or lower than) peers without CPS involvement raises questions about whether this medically fragile

population is receiving sufficient health care to address complex social and health needs.²⁶

Substantial differences in Medicaid expenditures were seen in the highest quartiles of health care spending. Differences persisted over the study and were concentrated among older CPS-involved children, those with mental health conditions, and those with recurring maltreatment concerns, suggesting that the observed difference in expenditures was not a simple reflection of acute health care received at the time of initial maltreatment. Recognizing subsets of children likely to accumulate substantially higher expenditures than expected after maltreatment can identify children for whom effective and efficient care may improve short- and long-term health outcomes. Among children with mental health conditions, differences in Medicaid expenditures based on CPS history persisted even when spending associated with mental health care was removed. This finding could reflect ineffective or inefficient health care services provided to CPS-involved children with behavioral health problems. Future research should explore whether collaboration between child health care and child welfare professionals to improve mental health screening and referral during initial CPS involvement may improve longitudinal health outcomes. The finding that children at highest risk for ongoing CPS involvement in the home accrue the highest differences in health

care expenditures suggests possible benefit from an integrated medical home to provide more effective and efficient health care for an at-risk child.^{27–29}

Results from this study must be considered in light of its limitations. As a single-state study, results may not generalize to settings with different child welfare or health care funding policies. Our results reflect a publicly insured population and are not generalizable to privately insured or underinsured children. In addition, our results reflect Medicaid expenditures only and do not reflect potential differences in private expenditures for the 2% to 3% of publicly insured children in our state who have simultaneous private payer coverage. Our analysis relied on administrative data, which may incorrectly categorize some children's health conditions. Our definition of severe chronic conditions was chosen to capture only high-cost medical conditions and may miss differences in health care expenditures for children with less severe chronic conditions. Likewise, this definition assumes similar maltreatment risk across different categories of severe chronic conditions, failing to capture possible overutilization and underutilization within subgroups of children with complex health care needs. We were unable to obtain Medicaid pharmacy data, which have been shown to contribute significantly to expenditures associated with mental health

diagnoses in previous research.^{17,21,22} Mental health care paid for out-of-pocket or through alternate funding streams is also not reflected. These limitations likely bias our results toward finding lower differences in health care spending.

Finally, we must emphasize that health care expenditures do not reflect health or health needs. The finding of increased Medicaid expenditures in a high-risk pediatric population should be seen neither as an indicator of overall health of the population nor as an indicator of quality of health care received. Health care costs are a valid indicator of resource utilization, however, and understanding where and why these cost differences exist may help to improve both health care policy and practice. Future research must explore reasons for and outcomes associated with differences in Medicaid expenditures identified. Planned analysis of patterns of health care utilization based on a history of maltreatment in this database may add to our understanding. Looking forward, however, linkage of data across health care and child welfare systems may truly help us recognize how child maltreatment and other adversities affect both short- and long-term health in this vulnerable population.

CONCLUSIONS

Children remaining at home after a first-time finding of maltreatment have Medicaid expenditures sustained over the years after CPS involvement that differ from peers without a history of CPS involvement. We found that differences in expenditures were concentrated within identifiable populations of children with a history of maltreatment, suggesting opportunities for innovation in the health care delivered to these populations. In the current context of rising awareness of the

FIGURE 3 Continued

(x-axis). (A) For children with a severe chronic condition, maltreatment was associated with lower average health expenditures in the upper 50th percentile of health expenditures, although this difference was statistically insignificant (Supplemental Table 1). (B) For children with a mental health (MH) diagnosis, maltreatment was associated with significantly higher average health expenditures in the upper 50th percentile of health care costs (dotted line). Differences in health expenditures persisted even when reimbursements for MH-associated care were excluded (dashed line).^a(C) For children with a single CPS finding of maltreatment, average health expenditures were minimally different compared with children with no CPS history (solid line). Differences were significantly higher for children remaining at home after multiple findings of maltreatment (dashed line) and for those who later enter foster care (dotted line). These differences resolved when health expenditures after foster care placement were excluded (dashed-dotted line). ^bAll analyses were adjusted as described in Figure 2, and all expenditures expressed in 2012 US dollars.

role of childhood adversity and lifelong health, as well as increased attention to accountability in health care, our findings may provide leverage for collaborative efforts to identify and support health care interventions to improve health outcomes for this high-risk pediatric population.

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ABBREVIATIONS

CI: confidence interval
CPS: Child Protective Services
DCFS: Division of Child and Family Services
DOH: Department of Health
ICD-9: *International Classification of Diseases, Ninth Revision*

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