

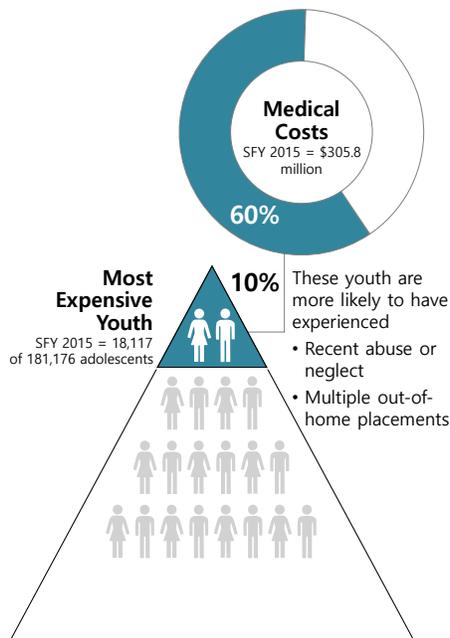
# Childhood Adversity and Medical Costs for Adolescents in Washington State

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Report to the DSHS Behavioral Health Administration, Division of Behavioral Health and Recovery and the Health Care Authority

**T**HIS RESEARCH BRIEF highlights results from a study examining the relationship between adverse experiences and healthcare costs of adolescents enrolled in Medicaid in Washington State. The brief focuses on findings about the association between adverse childhood experiences and *medical service* costs. A companion research brief highlights findings about the association between child adversity and *behavioral health* costs. Taken together, these two reports highlight the relationship between childhood adversity and increased healthcare costs.<sup>1</sup>

FIGURE 1.  
Ten percent of youth account for 60 percent of medical spending among adolescents



## Key Findings

- Youth in the top 10 percent of the distribution of medical costs accounted for 60 percent of all medical costs among 12 to 17 year olds enrolled in Medicaid.** A majority of medical costs for Medicaid adolescents were driven by a small number of youth with very high costs.
- Youth with a history of abuse and neglect or out-of-home placement were less likely to incur any medical costs.** Medicaid youth with maltreatment and placement histories were more likely to fall within the 13 percent of youth ages 12 to 17 who received no medical care in the year. This may be cause for concern if previously maltreated youth are not getting needed medical care.
- Youth with a history of placement instability, sexual abuse, neglect, or early childhood out-of-home placement had higher medical costs than youth without these experiences.** Extreme placement instability was associated with about \$700 in increased medical costs, recent abuse and neglect was associated with about \$450 in increased medical costs, sexual abuse was associated about \$350 in increased medical costs, and an out-of-home placement prior to age 4 was associated with about \$450 in increased medical costs.

<sup>1</sup> For complete results, consult Patton DA, Liu Q, Adelson JD, Lucenko BA. Assessing the social determinants of health care costs for Medicaid-enrolled adolescents in Washington State using administrative data. *Health Serv Res.* 2018;00:1–12. <https://doi.org/10.1111/1475-6773.13052>

## Data and Methodology

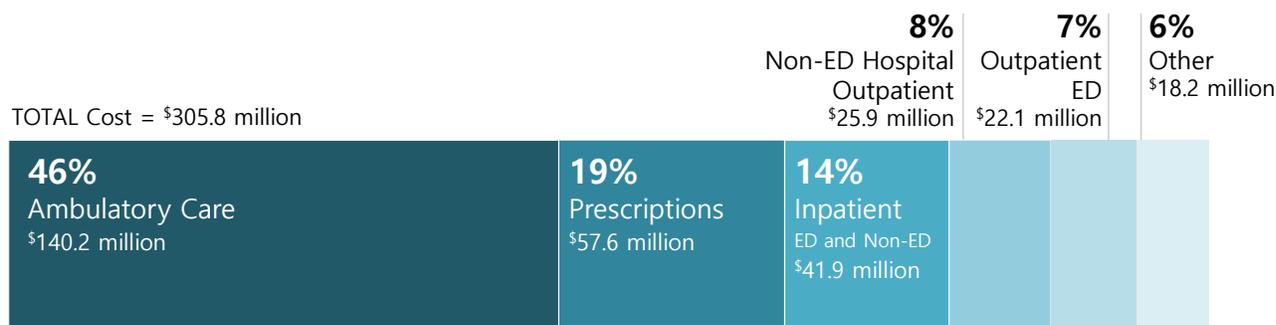
We identified all young people aged 12 to 17 who were enrolled in Medicaid for at least one month in State Fiscal Year (SFY) 2015 (N = 233,054). From this population, we selected youth who had at least one parent identified in the ICDB (N = 181,176). The population with at least one identified parent comprised our cohort for this analysis because we wanted to include both child experiences and parent risk factors in the model.

We identified each young person’s medical costs during SFY 2015. Medical costs included ambulatory care, prescriptions, inpatient hospitalizations, outpatient hospital services (including ED visits), and other medical services (transportation, durable medical equipment, laboratory claims, and miscellaneous support services). Costs were calculated using the amounts paid for fee-for-service claims, the managed care amounts paid to providers for managed care encounters, and other fees derived from ProviderOne (see the Technical Notes for detail). Behavioral health costs were not included, with the exception of psychotropic prescriptions. For detailed information on the relationship between adversity and behavioral health costs, consult the companion report.

Of 181,176 youth in the cohort, 156,899 (87 percent) had incurred any medical service costs in the year. These 156,899 adolescents had \$305.8 million in medical health costs in SFY 2015. Nearly half of the costs were for ambulatory care, 19 percent for prescriptions, 14 percent for inpatient services, 8 percent for non-ED hospital outpatient services, 7 percent for outpatient ED visits, and 6 percent for other medical services.

FIGURE 2.

### Distribution of Medical Costs



The total medical costs served as our dependent variable in a series of regression models. Predictor variables in the models fell into four broad categories:

- Child and family demographics,
- Child social and health risk factors,
- Child maltreatment history, and
- Parent risk factors.

The study purpose was to assess how child maltreatment history and parent risk factors were associated with medical costs after controlling for the effects associated with demographic and social/health risk factors included in the model. The child maltreatment and parent risk factors included in this study (e.g. abuse, neglect, parent substance use, parent criminal justice involvement) are analogous to factors defined as adverse childhood experiences in the “ACEs” literature. A complete list of predictor variables and descriptive statistics for the study cohort are available in the Appendix.

The analysis consists of a two-stage regression model. The first stage uses a logistic regression model to identify risk factors associated with the likelihood of receiving any medical service in the outcome year. The second stage uses ordinary least squares regression to identify risk factors associated with the cost of medical services in the outcome year, among youth with medical expenditures in the year.

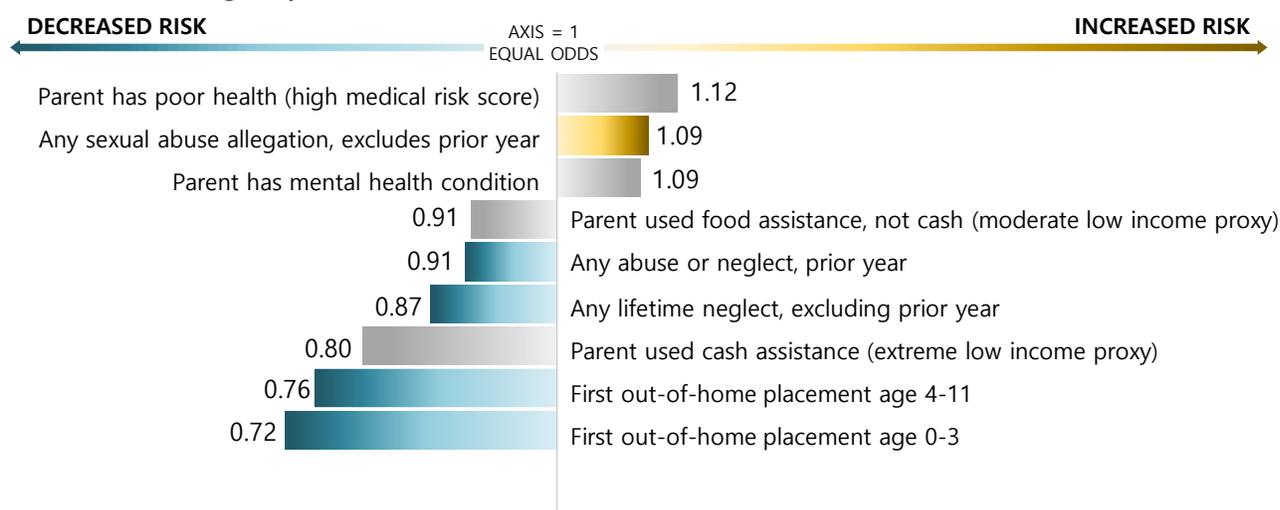
## Findings: Child Adversity and Use of Medical Care

In the first stage of the analysis, we assessed whether the predictor variables of interest were associated with greater likelihood of having any medical costs. A majority of the population received some medical care during the year, however a subset of population (13 percent) did not.

Figure 3 displays odds ratios from a logistic regression predicting any medical costs among our cohort of youth. Odds ratios greater than 1.0 denote a factor associated with increased odds of having any medical costs, while odds ratios less than 1.0 denote a factor associated with decreased odds of any medical costs. We display in Figure 3 below factors that were significant ( $p < .05$ ) after controlling for demographics and other social and health risk factors, such as having a chronic condition, mental health diagnosis, or juvenile justice involvement. The factors highlighted in yellow and blue correspond to maltreatment experiences, while the factors in grey correspond to parental risk factors.

FIGURE 3.

### Odds of Utilizing Any Medical Care<sup>2</sup>



**NOTES:** 1. This chart shows a subset of factors in the model—those that were statistically significant at  $p < 0.05$  only. 2. Bars shown in color with bold font represent maltreatment risk factors.

With the exception sexual abuse allegations which increased odds of medical care by about 9 percent, maltreatment factors were associated with decreased odds of receiving any medical care in the year. Allegations of abuse or neglect in the prior year, as well as any lifetime allegation of neglect were associated with decreased likelihood of receiving any medical care.

Larger reductions in the likelihood of receiving care were observed for children who had been placed in out-of-home care before the age of 12. Children who had a first out-of-home placement between ages 4 and 11 had 24 percent lower odds of receiving medical care, and children who had a first out-of-home placement prior to age 4 had 38 percent lower odds of receiving medical care, compared to children who were similar on other risk factors but were never placed out-of-home.

Parent risk factors were also associated with the utilization of medical services. Poor parental health (high medical risk score), and parental mental health issues increased the likelihood of medical care in youth. Parent use of food and cash assistance on the other hand, was associated lower odds of receiving any medical care in the year for youth.

It is concerning that certain risk factors were associated with the lack of any medical care in our study cohort, given that all adolescents are expected to receive at least a yearly well-child visit. The fact that

<sup>2</sup> Medical services exclude behavioral health services, with the exception of psychotropic prescriptions.

children with neglect histories, recent maltreatment, and early out-of-home placement experiences were less likely to receive care in adolescence indicates that access to medical care may be a significant issue for these children. Adolescents whose parents were more economically vulnerable (whose parents were Basic Food or TANF clients) also were less likely to receive any medical care, after controlling for their health conditions and other relevant factors.

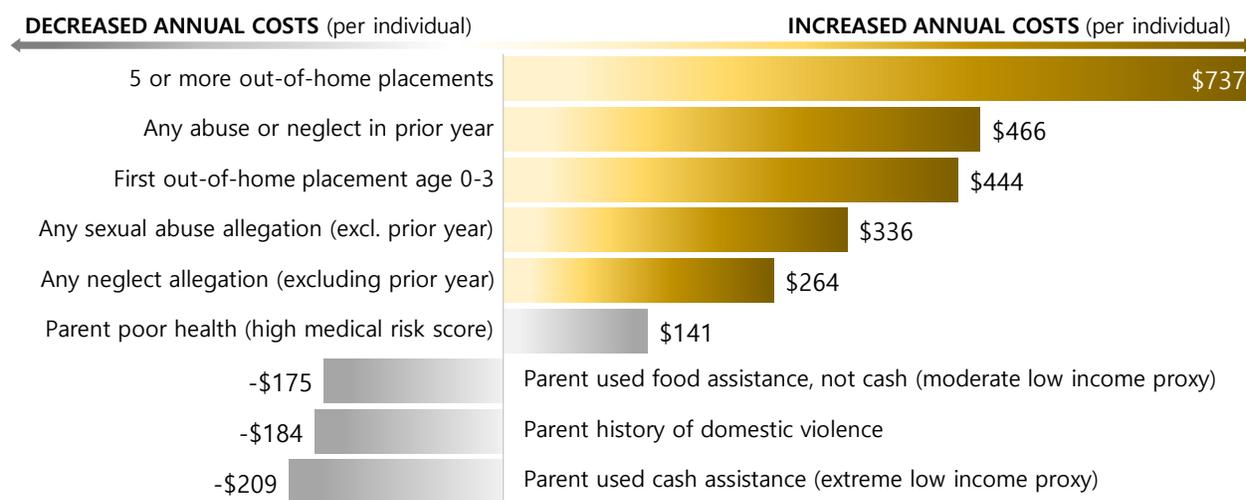
## Findings: Child Adversity and Medical Costs

In the second analysis, we assessed whether the predictor variables were associated with greater medical costs for adolescents, among those who had any costs in the year. This analysis focused on the 156,899 adolescents in our study cohort who received a medical service in SFY 2015.

Figure 4 displays additional costs associated with each predictor variable, which come from an ordinary least squares regression predicting medical costs. We highlight factors that were significant after controlling for demographics and other social and health risk factors, such as having a chronic condition, mental health diagnosis, or juvenile justice involvement. All factors in Figure 4 were found significant at the  $p < .05$  level.

FIGURE 4.

### Increases in Annual Medical Costs per Individual Adolescent



Maltreatment-related measures were associated with significant increases in medical costs. This is in contrast to the earlier finding that maltreatment was associated with lower likelihood to utilize medical services. This pattern of results indicates that while maltreatment was associated with a lower likelihood of receiving medical services, when examining only the youth who did access medical treatment, those with maltreatment experiences were more expensive.

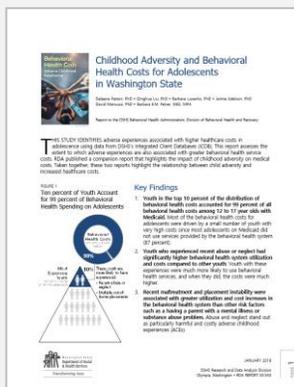
Youth with 5 or more out-of-home placements were \$737 more expensive per year, youth who had an abuse or neglect allegation in the prior year were \$466 more expensive per year, youth who had an out-of-home placement for the first time before the age of 4 were \$444 more expensive per year, youth who had any allegations of sexual abuse were \$336 more expensive per year, and youth who had any neglect allegations were \$264 more expensive per year. While lifetime sexual abuse and neglect allegation measures were each significant, the lifetime physical abuse allegation measure was not found to be significantly associated with medical cost increases in adolescence.

Recent abuse and neglect allegations were associated with greater medical costs, while early out-of-home placement (prior to age 4) appeared to have long lasting impacts on medical costs.

Placement instability was associated with the largest medical cost increase, though the measure probably captures the impact of instability and unmeasured risk associated with placement instability (e.g. unmeasured factors that make children hard to place).

A small number of parental risk factors were also associated with medical costs. Poor health of a parent (high medical risk score) was associated with higher medical costs of \$141 per youth per year. Parent history of domestic violence was associated with \$184 lower annual medical costs, receipt of food assistance (without TANF) was associated with \$175 lower annual medical costs, and TANF receipt was associated with \$209 lower annual medical costs.

Without additional analysis, it is difficult to draw firm conclusions about the implications of the lower medical costs associated with some parental risk factors. However, while the results are consistent with receipt of food and cash assistance acting as protective factors that help children remain healthier (e.g. through better nutrition and financial support), given that these factors were associated in the previous analysis with lack of use of *any* medical care, a potentially more plausible alternative explanation is that these children might be utilizing necessary care less frequently than similar children, leading to lower costs. A lack of access to necessary care may also account for the lower medical costs observed among adolescents in families with a history of domestic violence.



## Childhood Adversity and Behavioral Health Costs for Adolescents in Washington State

PATTON, LIU, LUCENKO, ADELSON, MANCUSO, and FELVER

<https://www.dshs.wa.gov/ffa/research-and-data-analysis>

In this companion brief, RDA examined the impact of adverse experiences on behavioral health costs. Key findings included:

- Behavioral health costs were spent on a small population of adolescents.** The top 10 percent of the distribution of behavioral health costs accounted for 99 percent of all behavioral health costs. This was in contrast to medical costs, where the top 10 percent of the distribution accounted for 60 percent of costs.
- Youth with recent experiences of abuse and neglect had significantly higher behavioral health system utilization and costs compared to other youth.** Experiencing any abuse or neglect in the year prior more than doubled the likelihood of receiving behavioral health services and increased behavioral health costs by over \$3,000 per year per youth. In contrast, in the medical costs report we found that recent abuse and neglect was associated with a lower likelihood of receiving medical care, but with higher costs for those who did get care.
- Recent maltreatment and placement instability had stronger associations with use of behavioral health services than parental risk factors.** Abuse and neglect stand out as particularly impactful adverse experiences.

## Discussion

Multiple state agencies across several delivery systems serve children and young people in Washington State. Over the next year, the Department of Children, Youth, and Families will absorb functions of the Department of Early Learning, Children’s Administration, and Juvenile Rehabilitation bringing together early learning, child protection, and juvenile justice functions. However, even after the new agency is created, physical and behavioral health services for children and youth will still be overseen by the Health Care Authority and their managed care contractors, services for those with intellectual disabilities will continue to be offered by Developmental Disabilities Administration in DSHS, and the Office of the Superintendent of Public Instruction will oversee K-12 education. Since services will continue to be distributed across multiple agencies, a cross-system approach continues to be important to address the needs of children and youth. Key policy takeaways from this report, which apply across child-serving agencies, include the following:

- **While abuse and neglect are associated with higher medical costs among youth using medical services, these experiences are also associated with lower odds of using any medical services.** Youth who have maltreatment experiences and access medical care have increased costs associated with that experience. However, youth who have maltreatment experiences are also more likely to receive no medical care at all. Therefore, while it is important to focus on prevention of maltreatment, it is also important for child-serving agencies to connect youth not only to Medicaid eligibility but to support them in accessing necessary medical care.
- **Maltreatment can have long-lasting impacts on medical costs.** We found that early childhood out-of-home care experiences had long-term impacts on medical costs, even when controlling for other risk factors and experiences. Preventing abuse and neglect in the first three years of life could reduce these costs, as could ensuring children and youth who do experience abuse and neglect receive the preventative care and medical treatment they need before health issues arise or worsen.
- **Among all the childhood adversities examined, maltreatment had the greatest impact on medical costs.** Placement instability, sexual abuse, and neglect increased medical costs significantly in the follow-up period. Among all the adverse childhood experiences detailed in the literature, abuse and neglect appears to be the most impactful. Identifying which vulnerable families are most at risk of abuse and neglect and providing effective service interventions could reduce future medical costs.

APPENDIX

TABLE 1.  
Demographic Characteristics and Prevalence of Risk Factors within the Population

Demographic Characteristics	NUMBER	PERCENT
<b>Total Number</b>	<b>181,176</b>	<b>100%</b>
<b>Gender</b>		
Female	89,165	49.2%
Male	92,011	50.8%
<b>Age</b>		
Average (SD)	14.4 (1.7)	
<b>Months of coverage in SFY2015</b>		
Medicaid months (SD)	11.0 (2.5)	
Third party liability months	1.2 (3.4)	
<b>Biological parents identified</b>		
One	30,483	16.8%
Two	150,693	83.2%
<b>Race or ethnicity</b>		
Hispanic	52,820	29.2%
Non-Hispanic White	77,587	42.8%
Non-Hispanic Black	9,279	5.1%
Non-Hispanic Indian	3,119	1.7%
Non-Hispanic Asian	4,834	2.7%
Non-Hispanic Pacific Islander	2,031	1.1%
Multiple races (non-Hispanic)	27,239	15.0%
Unknown race	4,258	2.3%
<b>Limited English proficiency (parent)</b>	30,101	16.6%
<b>Child Maltreatment History</b>		
<b>Maltreatment type</b>		
Any abuse or neglect	74,072	40.9%
Physical abuse	31,343	17.3%
Sexual abuse	12,536	6.9%
Neglect	66,896	36.9%
<b>Any out-of-home placement</b>	15,862	8.8%
<b>Number out-of-home placements (for ≥ 1 placement)</b>		
1-2 placements	9,800	61.8%
<b>Number out-of-home placements, continued</b>		
3-5 placements	4,458	28.1%
6-8 placements	1,070	6.7%
9+ placements	534	3.4%
<b>Age at first placement (for ≥ 1 placement)</b>		
0-3	7,876	49.7%
4-11	6,270	39.5%
12+	1,716	10.8%

<b>Child Social and Health Risk Factors</b>		
<b>Mental health condition</b>	65,702	36.3%
<b>Substance use disorder</b>	10,388	5.7%
<b>Arrest or conviction</b>	6,387	3.5%
<b>Has a biological child</b>	1,872	1.0%
<b>Pediatric Medical Complexity Algorithm</b>		
Non-chronic	126,604	69.9%
Chronic non-complex	38,167	21.1%
Chronic complex	16,405	9.1%
<b>Parent Risk Factors</b>		
<b>Domestic violence</b>	30,224	16.7%
<b>Low income</b>		
Cash or food assistance (proxy for low income)	128,842	71.1%
Food assistance only (proxy for moderate low income)	80,990	44.7%
Cash assistance (proxy for extremely low income)	47,852	26.4%
<b>Medical</b>		
High medical risk score (CDPS)	42,049	23.2%
Disability	24,693	13.6%
<b>Died</b>	5,647	3.1%
<b>Mental health condition</b>	71,761	39.6%
<b>Substance use disorder</b>	44,142	24.4%
<b>Arrest or conviction</b>	57,737	31.9%
<b>Homeless</b>	41,417	22.9%
<b>Number of parent risk factors (Adverse Childhood Experiences)</b>		
0	38,472	21.2%
1-3	88,610	48.9%
4-6	43,442	24.0%
7+	10,652	5.9%

## TECHNICAL NOTES

### STUDY DESIGN AND OVERVIEW

This study examines the association between childhood experiences of adversity and medical utilization and costs. Medical costs included ambulatory care, prescriptions, inpatient hospitalizations, outpatient hospital services (including ED visits), and other medical services (transportation, durable medical equipment, laboratory claims, and miscellaneous support services). Costs were calculated using the amounts paid for fee-for-service claims, the managed care amounts paid to providers for managed care encounters, and other fees derived from ProviderOne.

A large part of the Medicaid/SCHIP delivery system is via Federally Qualified Health Centers (FQHC) and Rural Health Clinics (RHC). The priced managed care data used in this analysis did not include FQHC-specific and RHC-specific encounter rate differential, and thus are an underestimate of true costs. The underestimate primarily impacts ambulatory costs, and is likely to lead to more conservative estimates of the impact of adversity on medical costs.

### STUDY POPULATION

The population for this report consists of 181,176 adolescents age 12 to 17 who were enrolled Medicaid in SFY 2015 and could be matched to at least one parent in the ICDB. For each adolescent, all medical costs in SFY 2015 were calculated using data in the ICDB. Two main analyses comprise the report

- 1) **Utilization of medical services.** A logistic regression analysis was conducted on all 181,176 adolescents to identify the risk factors that are associated with utilization of medical services.

- 2) **Medical costs.** An ordinary least squares regression analysis was conducted with the 156,899 adolescents who utilized medical services to assess which risk factors were associated with greater medical costs, given a youth had any service.

## DATA SOURCES AND MEASURES

Variable	Period (SFY)	Description
<b>Outcome Variable</b>		
Medical Costs	SFY 2015	Medical costs calculated using the amounts paid for fee-for-service claims, the managed care amounts paid to providers for managed care encounters, and other fees derived from ProviderOne.
<b>Child and Family Demographics</b>		
Sex	N/A	From social and health service records.
Race	N/A	From social and health service records.
Months of Coverage	SFY 2015	Number of months with Medicaid enrollment in 2015, according to state Medicaid records.
Limited English Proficiency	SFY 2010-2014	Non-English language spoken at home by parent and record of interpreter need at benefit eligibility determination appointment.
Age at Eligibility	SFY 2015	Age as of the first month in the outcome period with Medicaid coverage (restriction to ages 12-17). Source is DSHS service records.
<b>Child Maltreatment History</b>		
Physical Abuse	Lifetime (excl. SFY 2014)	Lifetime reported physical abuse comes from child welfare investigation records.
Sexual Abuse	Lifetime (excl. SFY 2014)	Lifetime reported sexual abuse comes from child welfare investigation records.
Neglect	Lifetime (excl. SFY 2014)	Lifetime reported neglect comes from child welfare investigation records.
Recent Abuse or Neglect	SFY 2014	Any physical abuse, sexual abuse or neglect reported in SFY 2014
Age at 1 <sup>st</sup> Abuse or Neglect	Lifetime	Based off of first reported abuse or neglect from child welfare investigation records. Grouped into age categories: 0-3, 4-11, 12+ years old.
Age at 1 <sup>st</sup> Placement	Lifetime	Age at first out-of-home placement (stratified by age: 0-3, 4-11, 12+) recorded by child welfare system.
5+ Placements Out-of-Home	Lifetime	Record of 5 or more different out-of-home placements over the lifetime of the child as recorded by child welfare system.
<b>Child Social and Health Risk Factors</b>		
Is a Parent	Lifetime	Child is a parent (has a biological child), as identified in birth certificate records, child support enforcement records from Division of Child Support, or prison visitation records from Department of Corrections.
Pediatric medical complexity algorithm	2012-2014	Measure of medical risk from pediatric medical complexity algorithm – chronic vs non-chronic, complex if comorbidity of conditions. Source data is medical claims data from Provider One (Medicaid claims). The PMCA is based on claims over 3 years (here 2012-14).
Substance use disorder	2010-2014	Substance-related diagnosis, service or encounters recorded in medical claims or publicly funded mental health records; any arrest for which a charge recorded is in a substance-related crime category.
Criminal Justice Involvement	2010-2014	Any arrest or conviction recorded by state patrol or court filings, including adjudication in state court database, for any crime category.
Mental Health Condition	2010-2014	Mental health diagnosis, service encounters, procedures or prescribed psychotropic medications recorded in medical claims or publicly funded mental health records.

Medical Risk Score	2014	Risk score via Medicaid (based on diagnoses and prescriptions) using Chronic Illness and Disability Payment System (CDPS)
<b>Variable</b>	<b>Period (SFY)</b>	<b>Description</b>
<b>Parent Risk Factors</b>		
Parent Death	Lifetime	Death of biological parent any time through SFY 2014 as recorded by State Health Department death certificate.
Parent Mental Health Condition	2010-2014	Mental health diagnosis, service encounters, procedures or prescribed psychotropic medications recorded in medical claims or publicly funded mental health records for either biological parent.
Parent Substance use disorder	2010-2014	Substance-related diagnosis, service or encounters recorded in medical claims or publicly funded mental health records; any arrest for which a charge recorded is in a substance-related crime category.
Parent Cash Assistance	2010-2014	Received Temporary Assistance for Needy Families (TANF) or Washington State Family Assistance (SFA) benefits (extremely low income).
Parent Food Assistance	2010-2014	Received benefits through federal Supplemental Nutrition Assistance Program (formerly known as food stamps) or Washington SFA Program, but never TANF (moderately low income).
Parent Homelessness	2010-2014	Indicates 1+ spell of homelessness, including shelter stays and couch-surfing/families who are doubled up, recorded by a financial eligibility worker during eligibility determination.
Parent Qualifies for Disability	2010-2014	SSI-related medical coverage (i.e.: disability-related coverage), or received services from the developmental disabilities administration, or received services from division of vocational rehabilitation.
Parent High Medical Risk Score	2010-2014	Received a risk score at or above the average level of health risk in the Disabled Medicaid population. The score is based on anticipated future costs compared to average costs expected for one patient.
Parent Domestic Violence	2010-2014	Any arrest for which a charge recorded is in a domestic violence crime category. Report of domestic violence in comprehensive evaluation (TANF families only), participant in address confidentiality program, or non-cooperation with division of child support is allowed due to domestic violence concerns.
Parent Criminal Justice Involvement	2010-2014	Any arrest or conviction recorded by state patrol or court filings, including adjudication in state court database, for any crime category for either biological parent. Any incarceration in department of corrections facility.
Number of Parent Risk Factors	Depends on factor	Sum of the number of unique types of parent risk factors. Score ranges from 0-9 (TANF and SNAP are combined into one broad poverty category).



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