
Child Maltreatment, Trauma, and Physical Health Outcomes: The Role of Abuse Type and Placement Moves on Health Conditions and Service Use for Youth in Foster Care

Yo Jackson, PhD, Christopher C. Cushing, PhD, Joy Gabrielli, PhD, Kandace Fleming, PhD, Bridget M. O'Connor, MA, and Lindsay Huffhines, MA

Clinical Child Psychology Program, University of Kansas

All correspondence concerning this article should be addressed to Yo Jackson, PhD, University of Kansas, 1000 Sunnyside Avenue, Room 2013, Lawrence, KS 66045, USA. E-mail: yjackson@ku.edu

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Abstract

Objective The purpose of the study was to investigate the relations between abuse types, non-maltreatment-related trauma, and health service utilization in a sample of youth in foster care with and without chronic medical conditions. **Method** A total of 213 youth, aged 8–21 years, provided self-report of general trauma and abuse exposure. Medicaid claims for each child were collected from official state databases. **Results** Exposure to sexual abuse, neglect, or general trauma but not exposure to physical abuse or psychological abuse increased the rates of medical visits, while only general trauma increased medical hospitalizations. **Conclusions** Trauma types are not equally predictive of health care utilization for youth with chronic health conditions.

Key words: at-risk youth; child maltreatment; chronic illness; health care services; trauma.

Exposure to trauma in childhood is common as results from both cross-sectional research and longitudinal studies indicate that as many as 40–71% of youth endorse experiencing at least one potentially life-threatening event during childhood (Finkelhor, Turner, Shattuck, & Hamby, 2013; McLaughlin et al., 2013). Given the fairly commonplace nature of trauma exposure, testing the impact of trauma on the mental and physical health of youth is not a new endeavor, and a myriad of studies have documented the often wide-ranging number and types of maladjustment, both physical and mental, that youth tend to demonstrate after trauma exposure (e.g., Heim et al., 2000; Lubit, Rovine, Defancisci, & Eth, 2003). What does vary, however, are the methods used to capture the relation between trauma exposure and outcomes, especially physical health outcomes.

Researchers have included retrospective and prospective measurement, as well as youth and adult report, and have included both healthy community and medical samples on which to test the effect of trauma on medical problems, medical and psychological diagnoses, and health service utilization (Hilker, Murphy, & Kelley, 2005). Moreover, studies differ in their attention to either one specific trauma (i.e., sexual abuse) or a group of traumas (i.e., different child abuse types), to combinations or cumulative experiences (i.e., child abuse and other significant traumas like car accidents and parental substance abuse; Chartier, Walker, & Naimark, 2010). The purpose of the present study was to examine variables of interest to the child maltreatment literature (i.e., child maltreatment types and non-maltreatment-related or general trauma exposure) and determine how these relate to

physical health care utilization. Moreover, the present study extended past research by including a focus on youth perhaps at greatest risk for poor adjustment, namely youth in foster care. Youth in foster care are often high consumers of health care services and there is a need to understand which experiences (e.g., types of maltreatment, trauma in general, and placement changes in foster care) predict service use.

Methods and Illness Outcomes in Child Maltreatment Trauma-Health Research

The predominant research methodology used to understand the physical health outcomes for youth exposed to trauma in general and child maltreatment specifically is to use retrospective reports from adults on both their history of exposure to trauma in childhood and their recent medical health conditions (Felitti et al., 1998; Irish, Kobayashi, & Dlahanty, 2010; Springer, Sheridan, Kuo, & Carnes, 2007). These studies demonstrate compelling agreement that childhood trauma and maltreatment is linked to a range of debilitating physical health concerns in adulthood. While retrospective methodologies are popular, asking participants at any age to report their own history of medical problems or service use (Gonzalez, Alegria, Prihoda, Copeland, & Zeber, 2011) can be problematic, as research suggests significant discrepancies between what adults recall years later and what the same individuals reported as youth (Fuller-Thomson & Brennenstuhl, 2009). Moreover, most studies (e.g., Hilker et al., 2005) that use self-report on health status have suggested that use of official insurance records might be the better way to document medical needs that resulted in actual health service use than asking participants to recall how often over their lifetime they went to the doctor and the diagnosis. Finally, regardless of research design, it appears that attending to trauma type is an important consideration (Danese et al., 2009). For example, Widom, Czaja, Bentley, and Johnson (2012) used a prospective cohort design matching maltreated and nonmaltreated children for medical follow-up 30 years after their identification. Although there were some commonalities between health outcomes across abuse types, exposure to physical abuse was associated with, among other outcomes, oral health and vision problems, whereas sexual abuse was associated with hepatitis C in adulthood. The results suggest that different types of maltreatment are associated with different physical health consequences.

Trauma and Health Care Utilization

The literature on adults (using self-report) reveals that women who reported childhood trauma had higher rates of health care utilization than those without a child trauma history (Bonomi et al., 2008; Sickel, Noll,

Moore, Putnam, & Trickett, 2002). Specifically related to child maltreatment exposure, adult women with a history of abuse were approximately two times more likely to visit the emergency department, and had higher overall health care costs than women reporting no abuse history (i.e., 16–36% greater expenditures; Bonomi et al., 2008). The higher overall costs can be attributed in part to the greater utilization of the emergency department, a consistent finding across studies of adult women who experienced child abuse (Arnold et al., 1999; Walker et al., 1999). The results of research on youth tend to echo these findings in that youth with a history of child maltreatment have higher health care utilization costs (Florence, Brown, Fang, & Thompson, 2013), more frequent hospital, primary care, and specialty health care visits (Bonomi et al., 2008), and more frequent emergency room visits (Chartier, Walker, & Naimark, 2007) than individuals with no history of maltreatment.

Foster Care Health Outcomes and Service Utilization

Compared with youth in the general population, youth in foster care demonstrate higher rates of physical illness as well as greater severity of physical health symptoms (Halfon, Mendonca, & Berkowitz, 1995; Jee et al., 2006; Leslie et al., 2005). In a study examining health risk behaviors of 993 youth aged 11–15 years in foster care, researchers found that 46.3% of the sample endorsed at least one health risk behavior, and history of physical abuse was significantly predictive of risk for engaging in health risk behavior (Leslie et al., 2010). Children in foster care appear to be a sensitive population even in comparison with other Medicaid recipients, as they have been found to experience more mental and physical health problems relative to other children receiving social welfare services (Harman, Childs, & Kelleher, 2000).

Aside from the examples cited above, research questions on predictors of health care utilization have rarely addressed youth in foster care, but children who have been removed from their biological parents' care are especially important for the study, given the following factors: (a) their life experiences and trauma exposure are nonnormative and potentially life threatening; (b) by moving caretakers, their access to the same health care providers is likely inconsistent; (c) placement in foster care is often unstable, as a significant proportion of these youth move homes multiple times over their course of their childhood, a unique trauma exposure not captured by studies on community populations; and (d) their lifetime exposure to trauma greatly exceeds what is typical, and their risk for poor health status currently and later in life is often quite high, making the need to understand the factors

that promote or increase the risk for positive health outcomes paramount. Therefore, the present study also extended past research to examine how child abuse and other traumatic events were related to medical diagnoses and health service utilization among youth in foster care.

The literature on the relation between exposure to trauma and health outcomes has provided the field with many important findings, but is also plagued by disparate approaches that often fail to account for the complexity of experience for youth, especially youth in foster care. Little consistent attention is given to the notion that children who have been maltreated may also have other significant life events (such as the traumatic loss of a caregiver) and that these experiences could carry significant weight in predicting health outcomes.

Therefore, the present study addressed the relation between child abuse types, general life traumas, and their relation to medical visits and hospital visits. Given that children with chronic illnesses are greater consumers of clinical services, chronic illness was also examined as a control variable, and was expected to be associated with higher health care utilization. Because no study has to date established whether specific types of abuse are differentially related to health service use, the present study explored whether each of four types of abuse (i.e., physical, sexual, psychological, and neglect) and non-maltreatment-related trauma events were uniquely related to health care utilization.

Methods

Participants

The sample was composed of 213 youth enrolled in foster care in a mid-sized Midwestern town. Participants ranged in age from 8 to 21 years, with a mean of 11.92 ($SD = 5.81$). Forty-eight percent of the participants were female. The sample included 51% who endorsed their ethnicity as African American, 31% endorsed Caucasian, 12% endorsed multiracial, and 5% endorsed “other race” category. All participants had been in their current foster placement for at least 30 days (longest stay 24 months) and had on average been in and out of foster care seven times in their lifetime.

Procedures

Studying Pathways to Adjustment and Resilience in Kids (SPARK) is a federally funded longitudinal project examining resiliency to abuse, neglect, and negative life events. The project recruits from the foster care system because of the relatively high frequency of these potentially negative events in this population. Recruitment of participants included a range of strategies such as advertisement of the project on foster

care list serves and in regional foster care newsletters, mailings and phone calls to eligible foster families, referrals from prior SPARK participants, and flyers given to newly trained foster parents. Eligible youth at residential facilities were invited in person to participate in the project. Consent was obtained from the state social service agency, serving as the children’s legal guardian. The authors’ University institutional review board and the State Department of Family Services review board provided approval for the study. All participants and their caregivers received information about the study, the voluntary nature of participation, and limits to confidentiality before provision of informed consent and assent at the start of each data-collection meeting. Data collection occurred in private rooms at community locations (e.g., local libraries, community centers, and residential facilities) convenient to the foster families and youth participants. Data for the present study were taken from the larger parent study (the SPARK Project), which collected data at three time points across approximately 6 months.

Youth provided self-report on maltreatment history. Data on medical history were obtained via chart review of the official Medicaid and state social service record, respectively. Medicaid records provided information on lifetime physical health conditions. For the present study, only physical health conditions that occurred within a 1-year window (3 months before enrollment in SPARK and 9 months beyond enrollment in SPARK) were evaluated. Children were excluded if they were <8 years of age, had lived in their current placement for <30 days, or had an Intelligence Quotient (IQ) of <70 as assessed by the Kauffman Brief Intelligence Test (KBIT). The cutoff of an IQ of 70 was used, as most measures for the study have not been validated in samples with cognitive deficits.

For the current study, youth provided answers with the assistance of an audio-computer-assisted self-interview (A-CASI) program on a laptop computer. Questions were read aloud to youth through the A-CASI program, and youth selected their answers via the A-CASI program. Youth completed all study questions through the A-CASI system, with the exception of the KBIT, which was administered by research staff face-to-face. The A-CASI helps to maximize autonomy and confidentiality through the use of headphones while also accommodating participants who may need auditory cues to assist with reading. The A-CASI session was supervised by clinical child psychology trainees, and youth participants were offered ample breaks and snacks and water to promote their ability to focus and remain on task during data collection. The study visits took approximately 3 hr to complete all consent/assent procedures, the study survey, and debriefing process at each time point. Each session concluded with a thorough debriefing to assess for and manage

changes in mood related to participation. The A-CASI was also reviewed for suicidal ideation and current abuse before dismissing each participant from data collection.

Youth were provided with modest compensation in the form of a \$20 gift card as thanks for their participation. Care was taken to ensure thorough debriefing and follow-up. In addition to a standardized debriefing process at the end of each data collection, a follow-up phone call was initiated within 48 hr to ensure the participant continued to maintain appropriate emotional well-being. See Jackson, Gabrielli, Tunno, & Hambrick (2012) for further details related to the methodology and procedures of the project.

Measures

Medical History

All of the youth were enrolled in Medicaid as their primary medical provider, and to determine the medical history of the youth, the Medicaid claims record for each child was provided by the state welfare agency to the investigators. Each child's history of medical diagnoses, medical visits, and medical hospitalizations was recorded. Medical hospitalizations are treated separately from psychiatric hospitalizations in the state Medicaid database. Therefore, our medical hospitalization variable did not include psychiatric inpatient stays that would be related to a mental health concern (i.e., suicide attempt, depression). The type of medical diagnosis was used to determine whether the child experienced a chronic illness, and the number of medical visits (e.g., any visit to a medical professional for a medical need) and medical hospitalizations were used as the outcome variables in separate analyses.

Chronic Illness Grouping

To capture a proxy for chronic illness, youth were assigned to one of two groups based on the diagnoses entered in their Medicaid record. Youth were categorized as having a chronic illness if they were seen for a condition meeting a modified definition from Van Cleave, Gortmaker, and Perrin's (2010) "any physical...condition that prevented him or her from attending school regularly, doing regular school work, or doing usual childhood activities or that required frequent attention from a doctor or other health professional, regular use of medication..." (p. 624). These included a pain condition that is commonly chronic (e.g., headache, abdominal pain, and joint pain), asthma/allergy, overweight/obesity/hyperlipidemia, apnea, or an elimination disorder. Youth were categorized as not having a chronic illness if they did not have one of these diagnoses (i.e., acute injury).

Maltreatment

For the present study, a self-report measure on maltreatment experiences was administered that enabled youth to identify specific types of maltreatment experienced (e.g., Physical Abuse: "Has anyone ever kicked or punched you?"; Sexual Abuse: "Has anyone ever forced you to look at their sexual parts?"; Psychological Abuse: "Has anyone ever threatened to hurt someone very important to you?"; Neglect: "Did your parents make sure you saw a doctor if you needed one?") during their lifetime across four types of maltreatment (i.e., physical abuse, 19 items; sexual abuse, 12 items; psychological abuse, 15 items; or neglect, 22 items). Maltreatment questions were derived from the Modified Maltreatment Classification System (MMCS; English & LONGSCAN Investigators, 1997), which is a revised version of the Maltreatment Classification System (Barnett, Manly, & Cicchetti, 1993). The format for this measure is similar to the MMCS—the items are reworded to facilitate self-report.

General Trauma

To determine the nature and degree of exposure to non-maltreatment-related trauma, youth self-report scores on the Life Events Checklist (LEC; Johnson & McCutcheon, 1980) were computed. The LEC is a measure of 46 events that youth may experience during childhood and includes experiences like being in an accident, parent going to jail, or serious illness in the family. Youth were asked to indicate whether any of the events had occurred in their lifetime.

Exclusion Criteria

To determine eligibility for the study, youth were administered the KBIT (Kaufman & Kaufman, 1990). Youth had to obtain an IQ of ≥ 70 on the KBIT to participate. The KBIT is a brief measure of verbal and nonverbal intelligence for children and adults (ages 4–90 years). The verbal scale includes Expressive Vocabulary and Definitions and the nonverbal scale includes Matrices. The KBIT was standardized on a nationally representative sample of children, adolescents, and adults, and has demonstrated high reliability and validity (Canviez, Neitzel, & Martin, 2005; Kaufman & Kaufman, 1990).

Data Analysis Plan

To determine whether the number of medical visits and number of hospitalizations that children experienced during the study was influenced by previous abuse experiences, main effects of Chronic Illness Group, life events, and number of each type of abuse event endorsed (psychological, sexual, physical, and neglect) on number of medical visits and number of hospitalizations during the study were examined separately for each outcome using multiple negative

binomial regression. The data for both outcomes are asymmetric with a right skew and a modal number of medical visits of 3 and a modal number of hospitalizations of 1. Negative binomial regression was chosen because the outcomes were counts of the number of medical visits and medical hospitalizations during the project and the relationship between the mean number of visits (4.64, 2.68) and the variance for visits (14.22, 7.14) for visits and hospitalizations suggested that a Poisson distribution would be overdispersed. The negative binomial includes a disturbance allowing the error term to vary as seen in the equation below.

$$\log \lambda_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_k x_{ik} + \sigma \varepsilon_i$$

where λ_i is the expected value of the outcome variable y_i for subject i , x_i are the independent variables with corresponding regression coefficients β_n , and $\sigma \varepsilon_i$ is the disturbance term. All parameters were estimated simultaneously. The estimate for the dispersion parameter in the number of medical visits model was .28, standard error = 0.05, with a 95% CI of 0.19–0.40. The estimate for the dispersion parameter in the number of hospitalizations model was .57, standard error = 0.10, with a 95% CI of 0.40–0.82. This supported the use of a negative binomial distribution because the dispersion parameters were significantly > 0 .

Results

Descriptive Statistics and Bivariate Correlations

Table I provides means and standard deviations as well as bivariate correlations for each of the variables above. The mean number of medical visits in the past 12 months was 4.64 (range: 0–21, $SD = 3.7$) and the mean number of hospital visits was 2.86 (range: 0–10, $SD = 2.67$). As a result of the chronic illness categorization, 108 youth were included in the chronic illness group, while 105 participants had no indication of chronic medical conditions in their files. Table II describes the frequency of each illness type. The results indicated that the number of endorsed psychological abuse events ranged from 0 to 23, with a mean of 7.16 ($SD = 5.12$). Number of endorsed sexual abuse events ranged from 0 to 12, with a mean of 2.23 ($SD = 3.09$). Number of endorsed physical abuse events ranged from 0 to 16, with a mean of 4.71 ($SD = 3.52$). Number of endorsed neglect events ranged from 0 to 22, with a mean of 3.10 ($SD = 4.38$). The total number of events endorsed was included as the total life event score in the analyses. Total life events reduced ranged from 3 to 30, with a mean of 22.98 ($SD = 5.91$).

For the present study, the abuse and general trauma variables were reported by the youth for their lifetime exposure. The chronic health variable was coded as

Table I. Intercorrelations, Means, and Standard Deviations of Variables

	1	2	3	4	5	6	7	8
1. Medical visits	—							
2. SPARK med visits	.40**	—						
3. Chronic illness	.16*	.29**	—					
4. Total life events	.17*	.16*	.02	—				
5. Psych abuse	.10	.12	.13	.38*	—			
6. Sexual abuse	.14*	.24**	.20*	.19**	.44**	—		
7. Physical abuse	.08	.03	.08	.39**	.68**	.38*	—	
8. Neglect	.08	.21**	.05	.03	.28**	.12	.20**	—
M	2.68	4.64	0.51	22.98	7.16	2.23	4.71	3.10
SD	2.67	3.77	0.50	5.91	5.12	3.09	3.52	4.38

Note. $n = 213$. Medical visits = number of medical hospital visits; SPARK med visits = number of medical hospital visits during SPARK. The bold values are statistically significant.

* $p \leq .05$, ** $p \leq .01$.

Table II. Frequency Statistics for Chronic Health Conditions

Chronic condition	Frequency (%)
Chronic pain	94 (44)
Asthma	63 (30)
Constipation/enuresis	26 (12)
Obesity	24 (11)
Sleep disturbance	2 (1)

Note. Participants could have more than one condition and may contribute to more than one category. Percentages are relative to the total sample.

any chronic condition, and medical visits and medical hospitalization were coded for any claim made to Medicaid during the 12-month window of the project. To determine whether the number of medical visits children experienced during the study was influenced by previous abuse experiences, main effects of chronic illness, life events, and number of each type of abuse event endorsed (psychological, sexual, physical, and neglect) on number of medical visits/hospitalizations during the 12-month timeframe in which the study occurred (i.e., medical care postabuse) were examined using multiple negative binomial regression. Results from the Omnibus Test for the model, indicated that the model as specified was significantly better than a null model, $\chi^2(6) = 43.17$, $p < .001$. Parameter estimates for each predictor and the 95% confidence interval can be seen in Table III.

Effect of Chronic Illness on Medical Visits

Results from the Omnibus Test for the number of medical visits indicated that the model as specified was significantly better than a null model, $\chi^2(6) = 43.17$, $p < .001$. The rate of medical visits during the project for those with chronic health conditions is 1.56 times the rate for those without chronic health conditions. The estimated marginal mean for number of medical visits for those with no chronic health conditions and mean levels of endorsed

Table III. Medical Visits Predicted by Abuse Type and General Trauma ($n = 213$)

	<i>B</i>	Exp(<i>B</i>)	95% CI
Intercept	.686**	1.99	1.28, 3.08
Chronic—yes	.446***	1.56	1.27, 1.92
Endorsed psychological	.004	1.00	0.97, 1.03
Endorsed sexual	.040*	1.04	1.01, 1.08
Endorsed physical	-.034	0.97	0.93, 1.00
Endorsed neglect	.032**	1.03	1.01, 1.06
General trauma	.024*	1.03	1.01, 1.05

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table IV. Hospital Visits Predicted by Abuse Type and General Trauma ($n = 213$)

	<i>B</i>	Exp(<i>B</i>)	95% CI
Intercept	.129	1.14	0.634, 2.04
Chronic—yes	.309*	1.36	1.03, 1.80
Endorsed psychological	.005	1.00	0.956, 1.03
Endorsed sexual	.029	1.03	0.981, 1.08
Endorsed physical	-.002	1.00	0.949, 1.05
Endorsed neglect	.011	1.01	0.980, 1.04
General trauma	.026*	1.03	1.00, 1.05

* $p < .05$, ** $p < .01$, *** $p < .001$.

maltreatment and life events across subtypes was 3.48. For those participants with chronic health conditions and mean levels of endorsed maltreatment across subtypes, the estimated marginal mean of medical visits was 5.44.

Effect of Abuse, Neglect, and General Trauma Events on Medical Visits

For every increase of one more endorsed sexual abuse event, the number of medical visits increased by a factor of 1.04. For every increase in one more endorsed neglect event, the number of medical visits increased by a factor of 1.03. Finally, for every increase in one more general trauma event, the number of medical visits during the 12-month study window increased by a factor of 1.03. No significant effects were found for physical abuse or psychological abuse.

To determine whether number of medical hospital visits was influenced by chronic health conditions, general trauma events, and maltreatment, similar models were evaluated. Parameter estimates for each predictor and the 95% confidence interval can be seen in [Table IV](#).

Effect of Chronic Illness on Hospitalizations

The results from the Omnibus Test for the number of hospitalizations indicated that the model as specified was significantly better than a null model, $\chi^2(6) = 13.65$, $p = .034$. The rate of medical hospitalizations for those with chronic health conditions was 1.36 times the rate for those without chronic health

conditions. For those with no chronic health conditions and mean levels of endorsed maltreatment across types, the estimated marginal mean for hospitalizations was 2.20. For those participants with chronic health conditions and mean levels of endorsed maltreatment across types, the estimated marginal mean was 2.99.

Effect of Abuse, Neglect, and General Trauma Events on Hospitalizations

For every increase in one more life event, the number of medical hospitalizations increased by a factor of 1.03. Type of abuse and neglect were not significant predictors of hospitalization.

Discussion

The purpose of the present study was to provide a collective examination of the relations between child maltreatment types, non-maltreatment-related trauma exposure, and health care utilization for a sample of youth in foster care. The project improves on past efforts that included only one or two types of trauma exposure or health outcomes by expanding the measurement of trauma to capture multiple exposures and varied ways of assessing health consequences in a sample of youth, namely youth in foster care, who may be at the greatest risk for both trauma exposure and poor health adjustment. By examining youth health history by using medical insurance claim data, the present study also provides a clearer indication of both actual diagnoses and health service use than would be likely from self-report.

The results of the current study suggested that when accounting for the effect of chronic illness on health care utilization, sexual abuse, neglect, and non-maltreatment-related trauma are all independent predictors of visits to a medical professional. Similarly, non-maltreatment-related trauma was an independent predictor of increased visits to the hospital during the study period. Taken as a whole, these findings provide evidence that the maltreatment and trauma history that accompanies a youth into the foster care system may be useful for understanding resource utilization and could help design cost-containment strategies. Moreover, the findings add to the field by augmenting the work of others' investigations of youth in foster care by documenting not only their health status, but also their service utilization (Rubin et al., 2004). This is particularly important when considering cost containment and prevention efforts for these youth. That is, an individual who enters the foster care system with the mean number (22.98) of non-maltreatment-related traumas (e.g., parent going to jail and serious illness in the family) for this sample can be expected to

go to the hospital 0.69 more times than an individual with none of these negative experiences.

The real consequence of the data presented above is probably in the cost to the Medicaid system. Based on the current data, we can estimate the increased cost as a result of hospitalization and in terms of visits to a pediatrician separately. First, the average cost of a pediatric hospitalization was \$5,200 in 2009 (Yu, Wier, & Elixhauser, 2009). This means that the youth in foster care with the mean number of non-maltreatment-related traumas (the only significant predictor of hospitalization) in the current sample costs Medicaid approximately \$3,588 more over a 12-month period than a child with no such negative life experiences. Said another way, each occurrence of non-maltreatment-related trauma could be expected to increase hospital-based health care utilization by \$208 over a 12-month window. Second, we can use the data to estimate the increase in cost as a result of increased primary care utilization. The average cost for a 9-year-old to visit his/her pediatrician is \$228 (American Academy of Pediatrics, 2012). This means that for a child with the mean number of sexual abuse events, the cost to Medicaid increases by \$20.34 every 12 months. A child with the mean number of neglect or non-maltreatment-related trauma would cost Medicaid approximately \$150.50 more in a 12-month period than a child with no maltreatment history. Therefore, services designed to decrease or appropriately triage health care utilization stands to offer considerable savings to the Medicaid program.

Given the real cost of health care utilization, it is in the best interest of program developers and policy-makers to target children with specific maltreatment and trauma histories (i.e., sexual abuse, neglect, and non-maltreatment-related trauma) to determine whether health care dollars could be reallocated from primary or tertiary care to other lower cost avenues. One possibility is that programming targeting the specific needs of youth with these experiences could produce a cost-neutral solution that may also have a significant positive impact on the youth's psychosocial functioning. For example, if a youth in foster care had experienced a large number of non-maltreatment-related traumas, past literature suggests these youth may also experience depression and externalizing problems (Burns et al. 2004). In this case, programs that seek to decrease health care utilization and address depression and aggression may be of greater long-term benefit, as they more appropriately target the mental-health needs of the youth.

The results of the study provide several significant contributions to the literature. One, the methods used in the present study allowed for both self-report of exposure as well as official documentation with regard to medical status. As in Rubin et al. (2004), the present study included the Medicaid database to

document the medical care and diagnoses of youth in foster care, and the rates in the present sample, although rather alarming, are consistent with other health investigations on youth in foster care (Rubin, O'Reilly, Luan, & Localio, 2007) and help explain the high cost of providing medical service to this important subsample of youth.

Two, the study provided a more holistic view of the trauma histories of the youth by examining not only the rather long list of abuse experiences that likely were responsible for their placement in foster care, but also considered that foster youth live in a world where they are just as vulnerable, if not more so, to exposure to general kinds of trauma reported by >40% of non-foster-care youth (Finkelhor, Ormrod, & Turner, 2007). Cumulative stress models make it clear that the accumulation of events, and not exposure to one kind of event per se, is key in predicting mental health outcomes (Layne et al., 2014). The results of the present study make it clear that this same notion is likely applicable to physical health outcomes, that is, more the trauma exposure, the stronger the link to health care utilization.

Three, although many studies have documented the relation between exposure to trauma, namely child maltreatment and adverse health outcomes, the present study is the first to document the specific relation between different types of abuse and health care utilization. Other studies have focused on specific types of abuse and found differential relations between abuse types and use of mental health services (Garland, Landsverk, Hough, & Ellis-MacLeod, 1996). The present study, however, is the first to document this relation in regards to physical health.

Limitations and Future Directions

Despite the contributions of the study, it is not without limitations. One, child maltreatment types often overlap within children and the present study did not account for the possible interaction of multiple types of abuse and their effect on health care utilization. The results, however, do point to the relative importance of each type of abuse, and additional research is necessary to determine how exposure to multiple types of abuse may change the relation between illness status and health service utilization. Two, the sample includes a fairly large age range, and it is possible that the relation to health service use is relative to the age of the child, with younger youth requiring more medical visits as a typical part of their development. Three, the present study did not test for possible gender effects, despite some evidence (Nikulina & Widom, 2014) pointing to specific types of abuse experiences as more common among girls than boys (i.e., sexual abuse). Future research should examine gender as a possible covariate to determine whether the relations presented here are consistent when gender is

considered. Fourth, our definition of chronic illness may have included cases that were not chronic in nature by allowing one instance of diagnoses that could be acute or chronic (e.g., headache) to be classified as chronic.

In addition to the contribution to the literature, the clinical relevance of the present findings is twofold. First, children in foster care are considered by the American Association of Pediatrics as a population with special health care needs (Committee on Early Childhood, Adoption, and Dependent Care, 2002). As such, particular attention should be paid to the multiple systems in which they interact including medical, mental health, social services, and juvenile justice to name a few. Given that the abuse is past and that placement in foster care is a given, clinical and research efforts should be devoted to careful consideration to what is modifiable, namely the response of health care providers to the multiple health needs of this population. To do so requires coordination across multiple providers who are similarly informed about the nature of trauma exposure unique to this population. One idea extending from these findings is to ensure that children with a maltreatment or nonmaltreatment trauma history are provided adequate access and perhaps even more frequent well-child care with their pediatrician. More frequent clinical encounters that could cut back on costly hospitalizations may be fiscally responsible in light of the current data.

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