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Adverse Childhood Experiences in Children Presenting to Integrated Pediatric Primary Care

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

By
Irene Jacobs
Master of Arts
Pace University, 2013

Director: Heather A. Jones, Ph.D.,
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Virginia Commonwealth University
Richmond, Virginia
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Abstract

ADVERSE CHILDHOOD EXPERIENCES IN CHILDREN PRESENTING TO PEDIATRIC PRIMARY CARE

By Irene Jacobs, M.A.

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University

Virginia Commonwealth University, 2020

Major Director: Heather A. Jones, Ph.D., Associate Professor, Department of Psychology

The prevalence of adverse childhood experiences (ACEs) has created a significant public health concern in the United States. A vast body of literature examining adult populations has displayed a dose-response association between cumulative ACEs and chronic illnesses (Chapman et al., 2004; Felitti et al., 1998). ACEs research conducted with children and adolescents has indicated higher ACE scores associated with learning and behavioral problems (Burke et al., 2011), health risk behaviors (Garrido et al., 2018), and mental health challenges (Mackner et al., 1997). However, ACEs research and subsequent interventions have largely relied upon retrospective data retrieved from adults (Felitti et al., 1998) and national datasets (Centers for Disease Control and Prevention, 2019; Greeson et al., 2014). Given the growing literature on ACEs in children and adolescents, the goal of the thesis project was to investigate the ACEs, psychosocial functioning, and healthcare utilization of youth presenting to a pediatric integrated primary care clinic (IPC) in an urban community. Participants were patients who complete an initial visit with the Pediatric Behavioral Health Team (Peds BHT) at VCU's Children's Hospital of Richmond. This IPC clinic serves a low income, racially diverse pediatric population (ages 3-17). This study utilized clinical data obtained from caregivers of patients

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presenting to the Peds BHT. Measures of cumulative childhood adversity (Adverse Childhood Experiences Questionnaire), child mental health (Pediatric Symptom Checklist-17), and demographic characteristics were examined. The present study utilized descriptive statistical analyses and linear regression models to examine relations between ACEs, mental health, and healthcare utilization in a pediatric sample presenting to IPC. The results indicated 81.3% of participants experienced at least 1or more Original ACEs (an ACE score ≥ 1), and 58.7% experienced ≥ 2 or more Original ACEs. For children in the 3-12 age group, Original ACE scores predicted overall mental health, (p =.008). The results also indicated a relationship between medical diagnoses and healthcare utilization. The results underscore the importance of screening for ACEs and mental health in pediatric primary care as early childhood stressors emerge.

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Adverse Childhood Experiences in Children Presenting to Integrated Pediatric Primary Care

In the United States, 20% percent of children and adolescents experience mental health disorders (Centers for Disease Control and Prevention, 2013). Nationally representative diagnostic rates from the 2016 National Survey of Children's Health (NSCH) indicate that attention-deficit/hyperactivity disorder (ADHD; 9.4%), conduct problems (7.4%), anxiety (7.1%), and depression (3.2%) are the most common mental health problems among children in the United States (Danielson et al., 2018; Ghandour et al., 2018). Many mental health disorders begin by age 14, and they often continue into adulthood (Kessler et al., 2005). Childhood mental health disorders are a significant public health concern not only due to their prevalence and early onset, but also due to their impact on children, families, and communities. (Perou et al., 2013). Early onset of a mental health disorder may influence the developmental trajectory of a child and create further maladaptive risks. Despite the high prevalence children living with significant mental health difficulties, 70% of these children do not receive any mental health services (Burns et al., 1995; Leaf et al., 1996; Olfson et al., 2015). Further, it is estimated that of economically disadvantaged children who are in need of mental health care, less than 15% receive services (Kataoka et al., 2002).

Children living with untreated mental health disorders may experience a myriad of challenges (Koppelman, 2004). For instance, untreated ADHD is associated with clinically significant impairments, such as academic difficulties, increased risk taking behaviors, and family maladjustment (Fredriksen, 2014). Children and adolescents living with untreated depression have a heightened risk of suicide (Thapar et al.,2012), decreased cognitive and social functioning (Berndt et al., 2000), limited educational attainment (Kessler et al., 2001), and

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psychosomatic symptoms (Leon et al.,1980). Children with unmanaged conduct disorder may display violent behavior (Loeber & Farrington, 2000), engage in substance use (Colins et al., 2010), risk involvement in the juvenile justice system (Teplin et al., 2002), and have a greater likelihood of recidivism (Wibbelink et al. 2017). Furthermore, untreated mental health disorders may also increase the likelihood of long-term physical health issues into adulthood (Shih and Simon, 2008).

Research has demonstrated a significant association between medical condition severity, mental health disorders, and functional impairment in children and adolescents (Merikangas et al., 2015; LeBlanc et al., 2003). The rising rates of physical-mental comorbidities are extending to younger populations (Sartorious, 2013). For instance, asthma is one of the most common chronic medical illnesses in childhood. Psychiatric comorbidities common in children with asthma are depression and anxiety disorders (Ortega et. al, 2002). Additionally, a diabetes study indicated that the risk of psychiatric problems such as mood disorders, anxiety disorders, and behavioral problems in children with type 1 diabetes compared with the general population tripled within 6 months after the onset of diabetes (Butwicka et al., 2015).

Children and adolescents with physical-mental comorbidity have increased healthcare utilization (Spady, 2005). A study examining pediatric hospital resource use in the United States indicated that pediatric hospitalizations in children's hospitals is five times greater for children with versus without a psychiatric diagnosis, and more than three-quarters of the children hospitalized with a psychiatric diagnosis were hospitalized for a primary medical diagnosis (Zima et. al, 2016). The increase and severity of children with physical-mental comorbidity presenting to primary care indicates the need for increased integration of mental health and medical specialty care in primary care settings (Merikangas et al., 2015).

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Adverse Childhood Experiences

Adverse childhood experiences (ACEs) are traumatic or stressful events such as abuse, neglect, and household challenges. A substantial body of literature suggests that childhood trauma elicited by ACEs contribute to a multitude of negative health outcomes throughout the lifespan (Felitti et al., 1998; Dube et al., 2001; Burke et al., 2011). The seminal Adverse Childhood Experiences Study was conducted by the Centers for Disease Control (CDC) and the Southern California Permanente Medical Group (Kaiser Permanente; Felitti et al., 1998). The researchers constructed the survey to focus on ten ACE types within three domains: Abuse (sexual, psychological, and/or physical abuse), Household Dysfunction (substance abuse, mental illness, witnessing domestic abuse, and criminal behavior within the household), and Neglect (emotional and physical) (see Figure 1). The researchers conducted two waves of ACE survey distribution in 1995 and 1997 to adult Kaiser Health Plan members in order to gain retrospective insight regarding their childhood experiences, behaviors, and health statuses. The results from the 17,337 respondents indicated that more than half of those surveyed experienced ≥ 1 ACE, and one in four respondents experienced ≥ 2 adverse childhood experiences. The original ACE study findings displayed a strong graded relationship between the breadth of exposure to abuse or Household Dysfunction during childhood and multiple risk factors for several of the leading causes of death in adults, indicating a dose-response relationship between ACEs and poor health outcomes, such as obesity and ischemic heart disease (Felitti et al., 1998). Furthermore, these findings displayed at least one out of every two people had been exposed to an adverse event before reaching adulthood, which points toward a high rate of trauma and populations at risk within the United States. The results of this study strongly support the notion that cumulative

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exposure to Abuse or Household Dysfunction has a substantial impact on the lifelong health and wellness of individuals starting from childhood.

Although the literature on the association between ACEs and adverse health outcomes in adult populations is fairly robust, fewer studies have examined the link between ACEs and health-risk behaviors in children and adolescents (Garrido et al., 2018). Child and adolescent ACEs research has modified the categories to include peer victimization (Duke et al., 2010) and examine psychosocial impairments (Ford et al., 2009). Burke et al. (2011) conducted a retrospective medical chart review for all pediatric patients seen at the Bayview Child Health Center to investigate ACEs. The study sample included 701 youth between the ages of 0 and 20.9 years (median age 7.33 years). Over two thirds of participants were exposed to 1 or more ACEs and an ACE score ≥ 4 was associated with increased risk of learning/behavior disorders and BMI ≥ 85% (indicative of risk of obesity; Burke et al., 2011). The findings from the Bayview Health Center research indicate the importance of screening for ACEs in order to understand the impact of trauma on development in a pediatric population. Furthermore, pediatric ACEs screening can provide practitioners with more insight regarding the onset of the chronic stress system.

The Study of ACEs and Youth

Toxic Stress. Although ACE-related health symptomatology and risk factors have been the dominant aspects of study, researchers have indicated that a maladaptive physiological stress response is a significant contributor to long term health outcomes (Shonkoff et al., 2012; Purewal et al., 2016). Extensive childhood exposure to prolonged adversity, subordination and stress within built environments create risks for lifelong chronic diseases (Boyce, 2014). The National Scientific Council on the Developing Child developed a taxonomy to describe three categories of

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stress experience that can affect the development of young children (National Scientific Council on the Developing Child, 2014). Positive stress is characterized by moderate, short-lived increases in heart rate, blood pressure, and stress hormone levels. The positive stress response is considered a normal and essential part of healthy development for the child. The second category, tolerable stress refers to physiological state that could potentially disrupt brain architecture (e.g., through stress-induced disruption of neural circuits), but is buffered by supportive relationships that facilitate adaptive coping (Shonkoff et al., 2009). Supportive relationships with parental figures, caregivers, and community mentors could serve as stress buffers. However, if a child's home environment is marked by instability, substance use, various forms of abuse, or chronic neglect from caregivers, the child is more susceptible to experiencing what has been conceptualized as *toxic stress*. Although researchers indicate small amounts of stress can develop resilience, in its toxic form, stress can greatly influence the growth and development of the child. Toxic stress can take a cumulative toll on an individual's physical and mental health—for a lifetime and lead to a greater likelihood of developmental delays and later health problems, including heart disease, diabetes, substance abuse, and depression (Harvard University, 2019). Pediatric researchers posit that a multidisciplinary framework is a key component of combating adverse childhood experiences (Garner et al., 2012). There is a shift toward pediatric primary care becoming a prime point for screening and intervention for youth at risk for exposure to adverse experiences and subsequent toxic stress accumulation (Oh et al., 2018; Garner et al., 2012).

Cumulative Risk Factors. The cumulative risk hypothesis of child development stems from the perspective that the number of risks factors a child is exposed to in their early childhood directly influences the prevalence of clinical disorders (Rutter, 1979; Sameroff et al., 2004).

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Research on cumulative risk and child outcomes began with Rutter's (1979) Isle of Wight sample, an epidemiological sample assessed in adolescence and at midlife. No differences were found in child adjustment for families with zero versus one risk factor, but a greater than fourfold increase occurred with the accumulation of two risks and an additional multiplicative increase at the level of four or more risks (Trentacosta, 2008). The cumulative risk model includes literature which examines family-centered social and environmental risk factors (i.e., maltreatment, inter-parental violence, family disruption, low socioeconomic status, and high parental stress) in early and middle childhood as they pertain to behavioral outcomes in adolescence (Appleyard et al., 2005). The risk factors are often assessed in terms of proximal factors relating to the family unit and distal factors relating to which environmental stressors the developing child may be exposed.

Cumulative risk factors have been examined in child populations in the context of psychological adjustment. For both Internalizing and Externalizing problems, the number of family risk factors was associated with longitudinal adjustment issues (Forehand, Biggar, & Kotchick, 1998). Also, higher accumulations of risk factors predicted lower academic achievement in 4th and 7th grade students (Ragnarsdottir et al., 2017). Other studies have replicated the effect of multiple risk factors on various outcomes such as delinquency (Lanza et al., 2014) and juvenile court involvement (Smokowski et al., 2004). Overall, there are important policy and practice implications of cumulative risk impacts on children as children confront multiple risk factors early in life (Evans et al., 2013). The use of a cumulative risk theoretical perspective has provided a useful framework to view and measure the proximal aspects of risk accumulation.

Measurement of Adverse Childhood Experiences. The impact of the Adverse Childhood Experiences Study contributed toward initiatives to conceptualize ACEs prevalence

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as a public health issue and initiate surveillance of the health burdens associated with ACEs (Anda et al., 2010). Through the United States Behavioral Risk Factor Surveillance System (BRFSS), an annual, state-based, random-digit-dial telephone survey, about one-third of states are collecting retrospective ACEs data (CDC, 2019). Another mechanism to assess ACEs is the utilization of child welfare records. Clarkson Freeman (2014) utilized the National Survey of Child and Adolescent Well-Being, the first nationally representative longitudinal study of children engaged in the child welfare system to examine ACEs and behavioral health outcomes. Additionally, data from the National Child Traumatic Stress Network (NCTSN) was assessed to document the prevalence of trauma types and their association with child/adolescent behavior problems among a national sample of 11,028 children and adolescents assessed and treated for trauma exposure (Greeson et al., 2014). As knowledge of ACEs has increased in primary care settings, researchers have also started measuring ACEs and healthcare utilization via self-report retrospective data (Chartier et al., 2010; Tang et al., 2006). Monitoring the prevalence of ACEs is an important public health practice, but reliance on retrospective assessment of childhood adversities and child welfare records limits clinical utility of the data. Furthermore, these assessment practices limit opportunities for upstream prevention.

A key determinant of combating the long term effects of prolonged or repeated exposure to childhood adversity is early screening. Prevention and intervention strategies rely upon assessing and identifying those at risk through standardized measurement. Oh and colleagues (2018) conducted a review of assessment and screening tools for measuring exposure to adversity in children and adolescents. Their investigation indicated that there are approximately 32 measures available that vary in utility based on content, target populations, developmental considerations, settings, and administration methods. Existing childhood adversity measures

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focus on identifying the presence of ACE categories (childhood maltreatment, household dysfunction, peer victimization), the severity of existing post-traumatic stress disorder, and general risk factors for cumulative toxic stress.

Numerous factors influence the quality of information gathered regarding a child's experience of adverse events. Given the sensitive nature of measuring exposure to adverse experiences, some assessment tools are designed for completion by caregivers. Utilizing caregivers to report the adverse experiences of their children can give insight toward household stressors, but it may also decrease the measure of exposure to adversities that might be peer-based or occur outside of the home, particularly for teenagers. In order to gain insight of exposure directly from children and decrease reporter discrepancies, researchers have also developed age-specific versions of ACEs measures (Bucci et al., 2015; Cincinnati Children's Hospital). The administration format is another significant consideration; there are self-report (paper and pencil) and interview-based (structured and semi-structured) versions of ACEs measures. Self-report checklists have been identified as efficient, cost-effective methods of measuring ACEs (Duggal et al., 2000) which fit particularly well with the constraints of medical settings.

The American Academy of Pediatrics published a policy statement, *Early Childhood Adversity, Toxic Stress, and the Role of the Pediatrician: Translating Developmental Science into Lifelong Health*, which outlines recommendations and emphasizes the central role of pediatricians in screening for exposure to adverse experiences and the accumulation of toxic stress (Garner et al., 2012). Furthermore, the AAP has established the Resilience Project in order to provide pediatricians with tools and training materials to transform medical practices into "comprehensive medical homes." ACEs are a topic of relevance within primary care settings due

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to the association between childhood exposure to adverse experiences and the incidence of adult risk behaviors and disease rates (Gillespie & Folger, 2017). Pediatricians often have regular contact with children and their caregivers for physical evaluations, which facilitates the rapport needed to administer well-being checks, discuss adverse experiences, and implement primary care prevention strategies. Healthcare settings are optimal for assessing cumulative risk and adverse experiences.

Screening in Integrated Pediatric Primary Care

In addition to actively screening for precipitants of toxic stress, the American Academy of Pediatrics encourages pediatricians to participate in innovative service-delivery adaptations that expand the ability of the medical home to support children at risk through an ecobiodevelopmental framework (Garner et al., 2012). Integrated behavioral health care, also known as the Primary Care Behavioral Health (PCBH) model of service delivery, enhances pediatric primary care capabilities through the integration of behavioral health services into primary care settings. The integrated approach to primary care employs the biopsychosocial model which supports the integration of biological, psychological, and social factors concerning health and disease (Engel, 1977; Halveka et al., 2009). Integrated care models provide collaborative services within the primary care clinic and involve the primary care physician and behavioral health provider sharing care of patients by formulating a multidisciplinary treatment plan. These models of care provide opportunities to address

mental health issues as an initial and primary task, which has been found to decrease repeated visits and reduce overall health care costs (Kenkel et al., 2005). The continuous collaboration the team of medical care providers conduct contributes to comprehensive and efficient medical treatment.

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Primary care settings are the gateway to the behavioral health system (Brown et al., 2007), as mental health screening is sometimes part of typical care. For instance, the screening tool currently utilized in many primary care settings is the Pediatric Symptom Checklist-17 (PSC-17), which is designed to screen for behavioral health problems (Gardner & Kelleher, 1999). Half of all pediatric primary care visits involve behavioral, emotional, developmental, psychosocial, and/or educational concerns (American Academy of Child & Adolescent Psychiatry, 2010). Furthermore, an examination of outpatient pediatric mental health care conducted by Anderson and colleagues (2015) indicated that one-third of children in the United States with mental health conditions are being treated solely by their primary care providers. Although pediatric primary care providers have been described as "de facto" behavioral health care providers throughout the literature, role, qualification, and time constraints present limitations to providing effective care (Norquist & Regier, 1996; Kessler & Stafford, 2008; Abed Faghri et al., 2010; Njoroge, 2016). The implementation of integrated healthcare in pediatric primary care settings facilitates opportunities for behavioral health clinicians to provide comprehensive care, improve healthcare quality, build upon physician-patient alliance, and increase the accessibility of behavioral healthcare. Furthermore, integrated behavioral health clinicians provide the expertise to assess psychosocial needs in relation to population health management strategies for individual patients, families, and pediatric practices (Talmi et al., 2018). Thus, the integrated pediatric primary care model of service delivery is uniquely positioned to enhance patient-centered medical homes through the administration of standardized screening tools to assess ACEs.

Statement of the Problem

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ACEs research has expanded scientific knowledge regarding adversity and adult health outcomes. However, the identification of adversities experienced by children and early detection of health risk still remains a significant public health concern. Although great scientific strides have been made within the past twenty years since the seminal Adverse Childhood Experiences Study was published (Felitti et al., 1998), the surveillance methods of ACEs have undergone continued refinement and application. A large portion of ACEs research is based on retrospective cohort studies and primarily rely on the life trajectories of an older population (Finkelhor, 2017). For instance, the average age of the patients in the ACEs study is 55 (Felitti et al., 1998). Utilizing adult retrospective ACEs data creates the potential for cohort effects to negatively influence the relevance of ACEs characteristics in present pediatric populations. Furthermore, the demographic landscape of the United States is rapidly changing. Screening for ACEs in areas that reflect the current racial, ethnic, socioeconomic, and environmental diversity of youth in the United States would increase the generalizability of ACEs research. An uptake of the surveillance of ACEs in pediatric populations would increase the utility of ACEs data and provide a stronger evidence base for intervention approaches.

Evidence suggests that those with ACEs may be higher utilizers of healthcare, especially specialty emergency services (Koball et al., 2019; Schüssler-Fiorenza et al., 2014). Although researchers have begun to examine the impact of ACEs on healthcare utilization, the few studies conducted have limited generalizability. For instance, some studies are ACE category-specific focusing on female survivors of abuse and healthcare utilization (Bonomi, 2008; Mercado et al., 2015). Furthermore, many researchers investigating ACEs and healthcare utilization relied upon retrospective reports of health status and utilization over an extended period of time (Chartier et al., 2007; Finestone et al., 2000; Koball et al., 2019). Reliance upon adults reporting lifetime

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healthcare service engagement could lead to recall and/or misclassification biases. The analyses of pediatric patient healthcare utilization and ACEs screenings can inform diagnoses and team-based integrated care strategies. Furthermore, the administrative shift toward electronic medical records could be utilized to leverage the data and contribute to changes in real time for pediatric patients.

Despite the professional guidelines from the American Academy of Pediatrics (2012), the American Academy of Child and Adolescent Psychiatry (2012), and pediatricians' beliefs that ACEs screening is necessary, Bright and colleagues (2015) found that clinicians serving primarily low-income families are not screening for ACEs consistently. Practitioner reported barriers to ACEs screening included insufficient knowledge, training, clinic visit time, mandated reporting, and lack of referral resources (Bright et al., 2015; Shonkoff et al., 2012). Rates of extreme stress and adverse experiences are significantly higher among low-income children, which has been linked to negative health outcomes (Wade et al., 2014). Furthermore, early detection of psychosocial stressors is crucial for enhancing the outcomes of children from low-income homes (Marie-Mitchell, Studder, and O'Connor, 2016). Without pediatric screening, pediatricians are missing important opportunities to enhance patient-centered care with this population.

The Present Study

Study Aims and Hypotheses

The present study utilized clinical data obtained from an integrated pediatric primary care clinic in a Southeastern metropolitan area. The aims of the study were as follows:

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Aim 1. This study sought to investigate the prevalence of cumulative ACEs and individual ACE categories in children and adolescents presenting to an urban integrated pediatric primary care clinic.

Hypothesis 1a. Given the prior literature (Burke et al., 2011; Felitti et al., 1998), it was hypothesized that a majority of the patient sample (>50%) would endorse experiencing ≥ 1 ACE criteria.

Aim 2. This study sought to examine the relationship between cumulative ACEs and psychosocial functioning.

Hypothesis 2a. It was hypothesized that the total ACEs would significantly predict the level of significant child psychological symptoms as indicated by a pediatric mental health screener.

Hypothesis 2b. It was hypothesized that the number of ACEs the patient endorses would significantly predict Internalizing symptoms within the sample.

Hypothesis 2c. It was hypothesized that the number of ACEs the patient endorses would significantly predict Externalizing symptoms within the sample.

Hypothesis 2d. It was hypothesized that the number of ACEs the patient endorses would significantly predict Attention problems within the sample.

Aim 3. This study sought to explore the individual and cumulative relations between childhood adversity and medical visits (i.e., pediatric primary care, specialty clinic, and emergency department visits). There were no specific hypotheses due to the exploratory nature of this aim.

Methods

Participants

Participants were patients who complete an initial visit with the Pediatric Behavioral Health Team (Peds BHT) at VCU's Children's Hospital of Richmond. Participants in this study

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included 75 pediatric primary care patients ages 3-17 years (*M*=9.33, *SD*=4.38) seen by the Peds BHT from August – December 2019. The patient sample included 36 females, and 39 males. Presenting caregivers largely consisted of mothers (*n*=53, 70.3%), fathers (*n*=8, 10.8%), and grandparents (*n*=6, 8.1%). Participant race, as identified by caregivers was 49.3% Black (*n*=37), 24% White (*n*=18), 14.7% Biracial or Multiracial (*n*=11), 2.7% Asian (*n*=2), and 9.3% other identities (*n*=7). Two-thirds of the patient population (66.7%) were insured through Medicaid. Overall, 28.7% of caregivers reported patient medical conditions, with asthma or COPD (38%) as the most prevalent preexisting health condition reported. Based on caregiver report, 41.1% of pediatric patients had a history of mental health treatment prior to their BHT initial visit. Additional demographic information is included in Table 1.

Procedure

Caregivers and their children were self-referred or referred by their pediatrician to the Peds BHT for child behavioral problems. Caregivers met with a team clinician for a 30-minute intake session where clinicians gathered information about the child behavioral problems through interview and administration of psychological measures. This study involved secondary data analysis of the clinical data set. Virginia Commonwealth University institutional review board approval was obtained prior to proceeding with the current study.

Measures

Demographics. Demographic information was collected through a Peds BHT initial visit form completed by clinicians through caregiver and patient interviews. Patient age, grade, primary caregiver, ethnicity, race, insurance status, mental health history, and health status were the demographic characteristics of interest in the present study.

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Healthcare Utilization. Healthcare usage, as defined by primary medical care and emergency department visits was measured through medical chart review. For each participant, retrospective chart review was conducted for the six months of healthcare usage prior to their initial visit with the BHT. Patient visits were categorized by primary care (PC), specialty care (SC), and emergency department (ED).

Adverse Childhood Experiences Questionnaire (ACE-Q). Exposure to trauma was assessed by utilizing adapted versions of the Center for Youth Wellness Adverse Childhood Experience (CYW ACE-Q) Questionnaire (Burke-Harris & Renschler, 2015). The measure is designed to act as a clinical screening tool that calculates exposure to Adverse Childhood Experiences (ACEs) for use in pediatric primary care and family medicine settings. The tool was developed based on the original ten ACE categorizes examined in the Felitti and Anda (1998) ACE Study. The original ACE-Q displays high internal consistency ($\alpha = .88$) and validity as a screening tool for retrospective assessment (Murphy et al., 2014). Based on patient age the instrument was either be completed by a parent informant (ages 3-12) or an adolescent self-reporter (ages 13-17). The two versions of the instrument are available in English and Spanish. In addition to the original 10 ACE questions, section two of the instrument includes an additional eight questions related to early life exposure to stressors such as bullying, involvement in the foster care system, loss of parent or guardian due to death, deportation or migration, community violence and medical trauma at the recommendation of community stakeholders and experts (Bucci et al., 2015). In the current study, both the total score from the Original ACEs and the total score from the Early Childhood Stressors were examined. The adapted version developed by Jones and Jacobs (2018) enhanced the cumulative ACE screener by asking respondents to

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also identify *which* ACEs are applicable, as opposed to only providing a cumulative total score for the number of ACEs applicable (see Appendix).

Pediatric Symptom Checklist-17 (PSC-17) The Pediatric Symptom Checklist-17 (PSC-17) is an abbreviated version of the PSC-35, a screening tool utilized to examine a broad range of emotional and behavioral problems and provide an overall assessment of psychosocial functioning (Gardner and Kelleher, 1999; Jellinek et al., 1988). This measure is intended for completion by caregivers in pediatric medical settings. The PSC-17 is comprised of 17 items answered by indicating never, sometimes, or often. It has subscales used to assess functioning in the areas of Internalizing, Attention, and Externalizing problems. The instrument is scored by assessing the total scores across domains. A PSC-17 total score of ≥15 is interpreted as above the clinical cutoff and indicative of clinically significant mental health symptomology (positive screening, Gardner and Kelleher, 1999). The subscale cutoffs are Internalizing ≥ 5, Attention ≥ 7, and Externalizing ≥7, and scores above the cutoff indicate clinically significant mental health symptomology. As reported by Murphy et al. (2016), the measure has high levels of internal consistency ($\alpha = 0.89$) and test–retest reliability (0.85).

Data Analytic Plan

Data Preparation. The present study includes data from the first 6 months of consecutive new patients screened for ACEs by the Peds BHT (August 2019-January 2020). Patient information from the Peds BHT database and patient medical records were utilized. Statistical analyses were performed using SPSS v.25.0 (SPSS, Chicago, IL) and Mplus version 8 (Muthén & Muthén, 1998 –2017). Prior to conducting the primary analyses, means, standard deviations and 95% confidence intervals were calculated for all continuous variables. Additionally, data was checked for univariate and multivariate normality, residual normality,

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linearity, and homoscedasticity, and multicollinearity. Any violations of the aforementioned normality standards would have resulted in data transformations (Tabachnick & Fiddell, 2007).

Characteristics of the Sample. Means, standard deviations, and ranges for continuous demographic and criterion variables were calculated. Percentages were calculated for categorical demographic and criterion variables.

Specific Aim Analyses. To address Aim 1, the total number of adverse experiences endorsed were summed. Responses to original ten ACE categories, and additional early life stressors relevant to youth were examined. Each category endorsed as an adverse event received a score of 1, resulting in a possible total score ranging from 0-10 for the Original ACEs and a possible total of 0-7 (child form) or 0-8 (adolescent form) for Early Life Stressors. The prevalence rate of each individual ACE within the population was examined via frequency calculations. Descriptive statistical analyses were calculated to describe the sociodemographic characteristics of our sample pertaining to ACEs.

To address Aim 2, descriptive statistics were calculated to examine the mental health functioning of our pediatric population and assess the prevalence of psychosocial symptoms. The PSC-17 total scores, as well as the Externalizing, Internalizing, and Attentional subscales were described. Simultaneous linear regressions were conducted to investigate whether ACEs total scores (child adversity) significantly predicted total PSC-17 scores (psychosocial symptoms) and/or any of the PSC-17 subscales.

To address Aim 3, utilization rates of pediatric primary care, specialty care, and emergency department visits through frequency counts. Medical visits documented in the electronic medical record (within the 6-months prior to their BHT Team intake) were examined. In order to investigate the factors influencing healthcare utilization, an exploratory path analysis

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was conducted in MPlus (Muthén & Muthén, 1998 –2017) to assess the relationship between ACEs, patient medical diagnoses, and psychosocial functioning in relation to healthcare utilization.

Results

Data Preparation

SPSS Version 25 (IBM Inc., 2019) and MPlus (Muthén & Muthén, 1998 –2017) were used to conduct all analyses. Descriptive statistics were evaluated and correlations between primary outcome variables and demographic data. Any correlations between demographic data and outcomes were controlled for appropriately as each hypothesis was tested. Initial data checking assessed the presence of normality, multivariate outliers and linearity. Normality of the data was assessed by examining skewness and kurtosis statistics based on standardized values less than 3.29, which corresponds with an alpha level 0.05, according to clinical research standards (Kim, 2013). Assumptions were met for all study variables.

Missing Data

The total proportion of data that was missing from all categorical and quantitative variables of interest were examined prior to conducting analyses. Little's Missing Completely at Random (MCAR) test was used to ensure that data is not missing from subjects in a systematic manner (Little, 1988). Little's MCAR test resulted in a nonsignificant p-value (p=.945), which displayed that data were missing in a random fashion and are not significantly influenced by a confounding variable. An MCAR test examining the two quantitative variables of interest (Original ACEs and PSC-17) demonstrated that the data was missing completely at random, $\chi 2$ (1) = .038, p = .85. PSC-17 data accounted for 29% of the missing data, and 1.3% of demographic data were missing. ACEs data had no missing data. Complete-case analysis solely

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including participants with complete data were utilized in the following analyses. Due to the percentage of missing PSC-17 data, Aim 2 results were interpreted with caution.

Aim 1: Prevalence of ACEs

Original ACEs. Analyses indicated 81.3% (*n*=62), of participants experienced at least 1 or more of the Original ACEs (i.e, an ACE score ≥ 1), 58.7% (*n*=44) experienced ≥ 2 or more of the original ACEs, 45.3% (*n*=34) experienced ≥ 3, and 32.0% (*n*=24) experienced ≥ 4 or more ACEs. Within the scope of the three ACE domains, Household Dysfunction was endorsed by 28.0% (*n*=21) of caregivers, Abuse was endorsed by 18.7% (*n*=14), and 13.3% (*n*=10) reported Neglect. The prevalence of individual ACE items varied from 4.0% (sexual abuse) to 53% (caregiver separation or divorce). See Figure 5 and Table 3 for the prevalence of individual ACE items.

Early Life Stressors. Caregiver report indicated a 53.3% (*n*=40) prevalence of pediatric exposure to early life stressors. Analyses displayed that 30.7% (*n*=12) of participants experienced one or more early life stressors, and 16% experienced two or more stressors. When the Early Life Stressors were included with the Original ACEs the data displayed 86.5% (*n*=64) of participants experienced at least 1 or more ACEs, 63.5% (*n*=47) experienced ≥ 2, and 58.1% experienced ≥ 3. The prevalence of Early Life Stressors varied from 2.7% (Romantic Partner Violence) to 21.3% (school bullying or harassment). In addition to bullying, caregivers endorsed a moderate rate of youth exposure to neighborhood violence (16.0%). The prevalence of each ACE category in this study population is summarized in Figure 6 and Table 4.

Aim 2: Psychosocial Health.

Mental health symptoms were assessed by the administration of the PSC-17 (*M*=15.50, *SD*=6.05). According to the participant data from the PSC-17 Internalizing (*M*=4.00, *SD*=2.60),

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Attention (*M*=5.70, *SD*=2.86), and Externalizing (*M*=5.37, *SD*=3.65) problem subscales, 16.6%, 46.2%, and 42.5% of the sample reported clinically significant results in the three areas, respectively. Greater than half of the caregivers (53.7%, *n*=29) reported a clinically significant total PSC-17 score. There were six preschool participants whose caregivers completed the preschool version of the PSC-17 (*M*=20.57, *SD*=10.44) and all of their scores met the at risk threshold. Scores ranged from 15-35 (scores 9 ≥ indicate at risk status). See Table 5 for PSC-17 subscale characteristics.

Adverse Childhood Experiences and Psychosocial Health. A series of simple linear regression models were designed to examine whether child adversity (total Original ACEs) predicted child mental health (PSC-17 total and subscale scores). Total ACE scores did not predict overall child mental health at intake, R^2 = .04, F (1,51) = 1.89, p = .18. Next, Internalizing, Externalizing, and Attention symptoms were modeled to examine whether total ACE scores predicted categories of mental health. The Original ACE scores did not predict Internalizing problems, R^2 = .25, F (1,51) = 6.03, p = .18, Attention problems, R^2 = .00, F (1,51) = .03, p = .87, or Externalizing problems, R^2 = .00, F (1,51) = .13, p = .72. Based on these results, the ACEs at intake did not predict child mental health.

Age differences. To investigate whether there were different patterns of relationships between ACE data and child mental health, the participants were split into two groups, child (ages 3-12, n = 52) and teen (13-17, n = 17) based on ACEs screening forms. Linear regressions were conducted to investigate the relationships for children and for teens. For children, Original ACE scores predicted overall child mental health (F (1,51) = 7.71, p = .008), with an R^2 of .13. They also predicted Internalizing problems, R^2 = .01, F (1,34) = 18.01, p < .001. ACEs did not

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predict child Externalizing and Attention problems. For teenagers, Original ACES did not predict overall mental health, internalizing, externalizing, or attention problems. See Table 5.

Gender Differences. To further investigate characteristic influences in relation to ACEs and mental health, moderation analyses were conducted. Hayes' (2018) PROCESS macro (Model 1) was used to generate 5,000 bootstrapped confidence intervals of the conditional effects. Analyses evaluated the hypothesized influence of gender on the relationship between ACEs and mental health. Gender did not moderate the relationship between ACEs and mental health, (β = -.057, t = -.059, p = .953).

Aim 3: Healthcare Utilization.

Healthcare utilization was investigated by examining the frequency rates of pediatric primary care, specialty care, and emergency department visits. In the six months prior to their Peds BHT intake, the sample had a total of 75 primary care visits, 59 specialty care visits, and 6 emergency department visits. This healthcare utilization ranged from 1 visit (38%) to 11 visits (1.3%), with the mode and median number of visits as 1. The most prevalent health encounter types were well child health exams and immunization visits (11.8%). The mean number of medical diagnoses was 3.35. The mode number of visits was 0 with a median of 1 visit. Dermatitis (4.2%) was the most common medical diagnosis. See Figure 7.

Healthcare Utilization & Health Status. Structural equational modeling was used to explore aspects of health, mental health, and healthcare utilization. In the path analysis examining the total number of ACEs, medical diagnoses, and mental health symptoms in relation to healthcare utilization, fit statistics confirmed a significant model at baseline, $\chi 2$ (3) = 69.65, p < .001. The model displayed good fit with all parameters freely estimated in the three groups

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(CFI = 1.00, SRMR = .00, RMSEA= .00). Utilizing the Bonferroni correction based on the data (p =.016), the results were assessed. Healthcare utilization was not significantly associated with ACE scores, -.010(.067), p = .83 or psychosocial health symptoms, -.057(.029), p = .047. The number of medical diagnoses assessed in participant medical records was significantly associated with healthcare utilization, .860(.041), p < .001. See Figure 8.

Discussion

This study aimed to examine relations between ACEs, mental health, and healthcare utilization in a pediatric sample presenting to IPC. The results indicate a significant rate of exposure to adverse childhood experiences, clinical levels of mental health symptoms, and moderate health system engagement. ACEs were endorsed by 81% of child caregivers. Analyses examining cumulative Original ACEs as a predictor of psychosocial functioning were non-significant. When the sample was explored based on age, ACEs predicted overall psychological functioning and internalizing problems for children (ages 3-12) only. The majority of pediatric patients in my sample had one health encounter, and it was with pediatric primary care. Finally, the present study investigated the relation between ACEs, cumulative medical diagnoses, and psychosocial functioning in relation to healthcare utilization, but the model only displayed a significant relationship between medical diagnoses and healthcare utilization.

The focus of Aim 1 was to investigate the prevalence of cumulative ACEs and individual ACE categories in children and adolescents presenting to an urban integrated pediatric primary care clinic. I found an 81.3% prevalence rate of pediatric exposure to one or more adverse experiences, consistent with the hypothesis that my sample would display ACE prevalence rate of greater than or equal to 50%. Examination of ACE screening studies conducted in pediatric primary care clinics indicate ACE prevalence rates ranging from 6% to 67% (DiGangi &

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Negriff, 2020). Data from the 2018 National Survey of Children's Health (2018) indicated that 33.3% of youth under the age of 18 were reportedly exposed to at least one adverse childhood experience (Health Resources and Services Administration [HRSA], 2020). In European ACE studies, ACEs have ranged from 14% - 70% (Alisic et al., 2008; Vink et al., 2019). The ACE prevalence in the present study is higher than national and European prevalence rates from pediatric studies. There are a few possible explanations for this discrepancy.

First, the characteristics of the current sample highlight the impact of social status on risk for adversity. For instance, two-thirds of my study participants (66.7%) were insured through Medicaid, indicative of families who are not be able to afford private insurance for their children and would likely be characterized as having low socioeconomic status (SES). ACEs are more prevalent in low SES populations, (Cohen et al., 2010; Halfon et al., 2017). In Richmond, one in five adults live below the poverty line, which influences the economic and household factors of children (U.S. Census Bureau, 2018). Infrastructural inequality, which includes challenges within the built environment (i.e., low resources, housing conditions, exposure to crime), influence the quality of life. Socioeconomic conditions in Richmond exert an important influence on life experiences, which may place children from low SES backgrounds at a higher risk of experiencing ACEs (Zimmerman et al., 2016).

Another factor relevant to Aim 1 is that the current study's sample was derived from a clinical setting, a behavioral health clinic. Clinical samples differ from community samples in important ways, including having more severe mental and behavioral health concerns than the general pediatric population (Murphy et al., 2014). ACE studies that display similar rates of clinical characteristics usually involve retrospective data from child welfare records (Garcia et al., 2017). Additionally, many ACE studies involve nationally representative datasets that

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include children or adults with non-clinical backgrounds or presenting for well visits, which may help explain the lower rate in the literature of cumulative ACEs (Bellis et al., 2014; Dube et al., 2003; Dong et al., 2005).

ACEs and Youth Mental Health

The second aim of the study was to examine ACEs as a predictor of psychosocial symptoms. Due to the degree of missing data for the PSC-17, these results will be interpreted with caution. When investigating the entire sample, the main analyses did not indicate a linear relationship between ACEs and overall psychosocial symptoms, externalizing, attention, and internalizing symptoms. Marie-Mitchell & O'Connor (2013) found that ACEs predicted behavior problems in a study examining 4-5 year old children (*N*=102) in an urban pediatric setting. Burke et al. (2011) found that behavior problems increased with ACEs in a large pediatric setting. Studies that utilized the Child Behavior Checklist (CBCL), a broadband measure of child mental health to assess ACEs found that children with higher ACEs typically had clinically significant scores for the internalizing and externalizing CBCL subscales (Greeson et al., 2013; Kerker et al., 2015). In a study that utilized the ACE-IQ (WHO, 2016) and PSC-17 to assess the association between adverse experiences in childhood on the risk of developing early behavioral problems the sample displayed that highly exposed children were nearly 5 times more at risk to develop symptoms of behavioral problems (El-Din et al., 2019). Respondents included adults, parents of children, and adolescents. A variety of informants may have produced that outcome, which differs from my study which only utilize parental informants. Additionally, the missing PSC-17 data may have underpowered my analyses, hindering me from finding significant relationships.

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Based on the robust literature displaying an association between ACEs and child mental health, I further explored the relations between psychosocial functioning and ACEs by conducting analyses based on child and teen age groups. Consistent with my Aim 2 hypothesis, the model assessing the child group's ACEs as a predictor of psychosocial functioning was significant. In my sample, children between the ages of 3-12 were likely to display psychosocial symptoms if they had experienced an ACE. This finding is supported by previous literature which indicates that early life exposure to ACEs is associated with poor early childhood mental health (Flaherty et al., 2006; Kerker et al., 2015). Although there is less literature exploring early and middle childhood effects of ACEs and mental health, this data is important since it may help child practitioners intervene before extensive medical and mental health comorbidities arise.

Consistent with my hypothesis, analyses based on age found that ACEs predicted internalizing symptoms in the child group. Hunt and colleagues (2017) found a prevalence of internalizing symptoms in middle childhood associated with ACEs exposure. Studies examining anxiety and depression in adolescents found a large presence of childhood anxiety disorders in primary care settings (Chavira et al., 2005) and a higher rate of cumulative ACEs resulted in greater rates of internalizing disorders (Lee et al., 2020). Adverse childhood experiences (ACEs) have been found to be significantly associated with internalizing disorders in numerous retrospective adult ACEs studies (Choi et al., 2017; Curran et al., 2016). Researchers have found a strong link between childhood adversity and internalizing disorders such as depression and anxiety (Jager-Hyman et al., 2012; Maniglio, 2013). Mental-physical health comorbidity has also been explored regarding ACEs outcomes and internalizing disorders. In a longitudinal population study, researchers found that a comprehensive retrospective measure of ACEs was related to comorbid depression and chronic pain conditions (Gonzalez et al., 2012). From Felitti et al.'s

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(1998) seminal work and throughout the adult literature the implications of childhood adversity and internalizing disorders displays greater risk for chronic health conditions.

Researchers have posited ACE subtypes, parent-child interaction quality, external social support, attributional styles, social competence, and self-esteem may operate as mediators contributing to child internalizing symptoms (Cicchetti & Valentino, 2006). Cecil and colleagues (2017) found that emotional abuse was uniquely predictive of internalizing disorders. Emotional abuse may be a particularly important risk factor for internalizing problems because repeated exposure to practices such as harsh speech or humiliation can negatively impact self-esteem (Berber Çelik & Odacı, 2020). A systematic review found that the studies examined consistently supported the co-occurrence of internalizing disorders and low self-esteem (Keane & Loades, 2016). Furthermore, family characteristics, such as low SES, are predictive of low self-esteem during childhood (McGee et al., 2001). Experiencing various forms of household dysfunction and economic instability during early childhood may lead to internalizing symptoms, in particular, hopelessness. Child attachment literature has extensively examined child rearing practices, neglect, and internalizing symptoms (Rubin & Mills, 1991; Vasileva & Petermann, 2016). Harsh parenting practices and the absence of positive interactions with adults may result in social withdrawal and the development of internalizing symptoms in children (Hildyard & Wolfe, 2002).

Healthcare Utilization

The purpose of Aim 3 was to assess health and the ways in which the pediatric sample engaged in the healthcare system. Healthcare utilization data indicated that most participants attended one medical visit, commonly primary care, within 6 months prior to visiting the BHT. Other studies with a majority pediatric Medicaid sample (Rubin et al., 2019; Sturm et al., 2010;

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Zickafoose et al., 2016), displayed higher ED and primary care visits than the current study's participants. Higher healthcare utilization can indicate high medical or psychosocial needs (Hargreaves et al., 2015; Kuhn et al., 2020). The normative pediatric primary care visit trend displayed by my sample may indicate that the integrated primary care model of healthcare is efficacious for the patient group sampled, although this requires further investigation. The broad specialties and services available to the pediatric sample might indicate a decrease in health service needs. The adult IPC literature has displayed that the integrated model of healthcare decreases ED utilization, hospitalizations, and improves health outcomes (Lanoye et al., 2017; Reiss-Brennan et al., 2016).

Through structural equation modeling, the relationship between medical diagnoses, cumulative childhood adversities, and mental health symptoms in relation to healthcare utilization was examined. This exploratory aim represents one of the first efforts toward assessing child mental and physical comorbidities, cumulative adversities, and healthcare utilization in an integrated pediatric primary care setting. Cumulative medical diagnoses emerged as the sole significant predictor of healthcare utilization in the model. This finding regarding multi-morbidity as a predictor of increased healthcare utilization is congruent with the pediatric and adult medical care engagement literature (Miller et al., 2016; Wodchis et al., 2016). According to the United States Department of Health and Human Services (2014), children and adolescents make up nearly a tenth of the total population of Americans living with multiple chronic conditions. Common diagnoses present in our sample, such as hypertension and obesity, may lead additional chronic conditions such as heart disease and diabetes. Since the severity and diagnosis of many chronic health conditions may persist into adulthood the management of conditions is key to minimizing healthcare cost and enhancing quality of life for patients.

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Further, the model did not display a relationship between psychosocial functioning and healthcare utilization. Conversely, there is an extensive literature that establishes an association at different ages in childhood (Marie-Mitchell & O'Connor, 2013; Suku et al., 2019). A meta-analysis examining psychological factors and pediatric health care utilization found a significant association between psychological factors and pediatric health care utilization (Lavigne & Meyers, 2019). Interestingly, the inability of the data to display a relationship between psychosocial functioning and healthcare utilization is similar to a finding with a similar urban adult sample presenting to IPC (Sadock et al., 2014). The finding may reflect the smaller sample of patients in the overall sample that completed the PSC-17 measure. Another factor could be that this high ACE sample may face other stressors that may supersede the identification of psychosocial symptoms as it relates to rates of healthcare utilization.

Although ACEs did not display an association with healthcare utilization in the present study, the adult literature displays a strong association and dose-response relationship (Felitti et al., 1998; Hargreaves et al., 2019; Koball et al., 2019). The results of a representative population sample study asserts that adverse childhood experiences are overlapping risk factors for long-term adult health problems and that the accumulation of these adverse experiences increases the risk of poor adult health (Chartier et al., 2010). The pediatric sample displayed a high rate of ACEs, but due to age (M=9.33) may not be displaying physical health conditions associated with the impact of prolonged toxic stress. Comparatively, the ACE Study (Felitti et al., 1998) indicated a relationship between health status with an average participant sample aged 57 years. Due to the extensive ACEs literature that indicates a connection between ACEs, chronic health conditions, and early mortality, more investigation of this finding is needed with larger child samples.

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Study Limitations

This study is not without its limitations. The study data are cross-sectional and cannot determine causation or directionality of the effects regarding ACEs, psychosocial functioning, and healthcare utilization. There are a few limitations surrounding parental report in the study. Due to the sample being comprised of pediatric patients presenting to behavioral health, the results may not generalize to a non-clinical or general pediatric population. ACEs data was obtained solely from parent reporters. Child clinical assessment best practices sets a standard of multiple informants (Hunsley and Mash, 2007). Recall bias regarding child adversities, and limits of parental knowledge of adversities may have impacted the accuracy of the screening data. Given the cumulative assessment of ACEs and a participant age range of 3-17, memories may not be accurate, and may have impacted ACE reporting. Additionally, adolescent participants may have more autonomy and lived experiences of which caregivers are unaware. Regarding psychosocial functioning screening, parental informant ratings may reflect behavior based on the parent-child dynamic or family factors. Although parent-adolescent discrepancies are viewed as problematic to diagnostic validity and reliability, parent-adolescent researchers have recommended the inclusion of dyad data with meaningful exploration into attribution bias (De Los Reyes and Kazdin, 2005; De Los Reyes, 2013; Martel et al., 2016). The report of some ACEs may be perceived as socially undesirable or leading (e.g., domestic violence, child maltreatment) and may have resulted in parental underreporting. Wekerle and colleagues (2001) found that adolescent self-report data displayed an association with dating violence, child maltreatment history, and post-traumatic stress disorder symptomology. Adolescent report of ACEs is important for access to services and intervention.

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The use of the ACE-Q (CYW, 2011) screening tool may have restricted the breadth of ACEs elicited from informants. The original ACE Questionnaire (Felitti et al., 1998) has been extensively critiqued (Finkelhor, et al., 2013; Karakatin & Hill, 2019) for lacking a diverse set of ACEs. The ACE-Q includes a second section with questions addressing stressors such as bullying, community violence, and parental deportation. However, the brief screener may not be a comprehensive measure of individual ACEs. Wade et al. (2014) conducted a qualitative study with a sample of urban adolescents, and found that focus group members endorsed a broader array of ACEs than the original ACE screener. For instance, the theme of socioeconomic stressors, namely economic hardship emerged. Regarding instrument design, the dichotomous nature of the measure of the response options (yes or no) does not allow for a rating of severity or frequency of ACE exposure, which decreases psychometric validity (McLennan et al., 2020).

The sample size of the study was not adequate to find an effect for the healthcare utilization analyses. Determining sample size requirements for structural equation modeling (SEM) is a challenge often faced by researchers (Wolf et al., 2013). Kline (1998) recommends that the sample size of a structural equation model should be composed of a minimum of N=200 and 10-20 times as many cases as parameters. Despite the sample base of six months of initial BHT visits, my lower sample size may reflect the challenges surrounding patient no-show rates for outpatient behavioral health services (Mehra et al., 2018; Ofonedu et al., 2017). In another study examining ACEs and healthcare utilization the sample contained 345 participants (Witges et al., 2019).

Despite the benefits of administrative health records as an objective form of clinical information, EMR data might be unreliable due physician documentation and administrative coding practices. Research has indicated an extensive range of code errors in medical records

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such as variance in the electronic and written records, quality control efforts, and coder errors (O'Malley et al., 2005). The clinical value in utilizing EMR as secondary data for research is contingent upon the data management practices. Validation processes for secondary EMR data are intricate (Brundin-Mather et al., 2018), without the ability to conduct verification, the extent of the data validity for the present study is unknown. Additionally, the EMR data for study participants only spanned six months prior to their behavioral health encounter which does not provide a comprehensive view of participant diagnoses and overall health.

Clinical and Research Implications

This study is among the first of its kind to examine the complex relationship between ACEs, mental health, and healthcare utilization in an IPC pediatric sample. The application to the ACE framework to explore pediatric health in an integrated primary care setting created an opportunity to examine the functionality of the pediatric medical home. The adaption of the ACE-Q to include individual ACEs, in addition to cumulative, created an opportunity to examine which ACEs youth were experiencing the most. Furthermore, the reporting of individual ACEs can be used to identify the subpopulation of children at highest risk for poor outcomes throughout the life span. Understanding which adversities youth are facing creates an opportunity to enhance service delivery and provide access to buffers of toxic stress.

The study findings display the importance of systematic screening of childhood adversity and mental health in pediatric primary care settings. There is a significant degree of under diagnosis of clinical disorders in pediatric primary care settings. Previous research highlights that missed opportunities for clinical diagnoses occurred at a rate of 62% in primary care (Rinke et al., 2017). The traditional role of primary care providers as the gatekeepers of behavioral healthcare access decreases the likelihood that pediatric patients will receive adequate mental

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health services. Furthermore, persistent health disparities further reduce the narrow opportunities for economically disadvantaged and racial/ethnic minority children to gain access to services (Alegria et al., 2010). When practitioners miss opportunities to screen, assess, and diagnose pediatric patients, there is also a missed opportunity for the primary care setting to act as a buffer against toxic stress. Furthermore, there are missed opportunities to connect caregivers to additional services and early interventions.

The integrated pediatric primary care model of service delivery is uniquely positioned to enhance patient-centered medical homes through the administration of standardized screening tools to assess ACEs, cumulative risk factors, and child mental health in addition to physical health. The results of the study demonstrate heightened risk with preschool ages and clinical levels of mental health impairment in children. These findings demonstrate the need for further research and exploration of the potential causal role that exposure to adverse childhood experiences may play in the development or exacerbation of childhood diseases, as well as in the risk for developmental delays, and behavioral problems in childhood (Burke et al., 2011). Early intervention can change the trajectory of mental illness and impact mental resilience. Designing pediatric patient-centered medical homes with behavioral health clinicians may be an important way to improve child behavioral and physical healthcare (Asarnow et al., 2017).

The uptake of routine ACEs and mental health screening in pediatric primary care may lead to enhanced trauma-informed care in pediatric settings. Trauma-informed care acknowledges the need to understand a patient's life experiences in order to deliver effective care and has the potential to improve patient engagement, treatment adherence, and health outcomes (Menschner and Maul, 2016). The National Child Traumatic Stress Network (2020) states that a child centered trauma-informed service system includes such practices as routine screening for

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trauma exposure and related symptoms, culturally appropriate, evidence-based assessment and treatment for traumatic stress and associated mental health symptoms, engagement in efforts to strengthen the resilience and protective factors of children and families impacted by and vulnerable to trauma, and making resources available to children, families, and providers on trauma exposure impact and treatment. Implementation of trauma-informed care requires a cultural shift in in pediatric primary care service settings (Marsac et al., 2016). Screening for ACEs provides pediatric primary care providers the insight needed to provide adaptive, trauma-informed care to their patients. Although trauma-informed care is endorsed by the American Academy of Pediatrics (2014), American Medical Association (2019), and the Substance Abuse and Mental Health Services Administration ([SAMHSA], 2015) as a healthcare strategy to mitigate the effects of adverse experiences, additional research is needed to enhance the understanding of the impact of trauma-informed approaches on children in pediatric healthcare systems. Furthermore, fostering resilience the key tenet of trauma-informed care, and is crucial for children with potential traumatic stressors (Earls, 2018; Horner et al., 2019).

Conclusion

The present study is important because it adds to the child adversity literature by examining ACEs in relation to the mental and physical health of youth presenting to pediatric primary care in an urban medical center. Despite the knowledge that low SES populations face extensive stressors that may impact children, many youth are not assessed for cumulative risk factors as they pertain to health and development. The data highlight the need for early screening and intervention to mitigate long-term health consequences of repeated or prolonged exposure to toxic stress. There is a need for continued research on how to optimize the effectiveness of the patient centered medical home model to adequately address social determinants of health.

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Tables

Table 1

Participant Demographics

Sample Demographics	*M* (*SD*)	*n* (%)
Age	9.33 (4.38)	-
Gender		
Female	-	36 (48)
Male	-	39 (52)
Race		
Black	-	52(49.3)
White	-	18(24.0)
Asian	-	11(14.7)
Biracial/Multiracial	-	2(2.7)
Other	-	7(9.3)
Ethnicity		
Latinx/Hispanic	-	12(16)
Non-Latinx/Non-Hispanic	-	61(81.3)
Unknown	-	2(2.7)
Insurance Status		
Medicaid	-	50(66.7)
Medicare	-	1(1.3)
Private	-	19(25.3)
Self-Pay	-	2(2.7)
Other	-	3(4)
Medical Diagnosis	-	21 (28.7)
Previous Mental Health Treatment	-	30 (41.1)

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Table 2

Total Number of Original ACEs Reported by Each Participant

Total Number of ACEs Reported	*n*	*%*
One ACE	14	18.7
Two ACEs	17	22.7
Three ACEs	10	13.3
Four ACEs	10	13.3
Five ACEs	7	9.2
Six ACEs	4	5.3
Seven ACEs	7	9.2
Eight ACEs	2	2.6
Nine ACEs	3	3.9
Ten ACEs	1	1.3

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Table 3

Prevalence of Individual Categories of Adverse Childhood Experiences

Original ACE Categories	*%*
Caregiver Separation or Divorce	53.3
Familial Incarceration	24.0
Family Mental Illness	44.0
Witnessed Abuse in Household	26.7
Emotional Abuse	24.0
Sexual Abuse	4.0
Physical Neglect	8.0
Physical Abuse	24.0
Substance Use in Household	16.0
Emotional Neglect	18.7

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Table 4

Prevalence of Early Life Stressors

Early Life Stressor Categories	%
Foster Care	5.3%
Harassment or Bullying	21.3%
Parent/guardian died	5.3%
Parent/guardian deported	2.7%
Serious medical illness or procedure	8.0%
Neighborhood violence	16.0%
Identity based discrimination	4.0%
Romantic partner violence	2.6%

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Table 5

Descriptive Statistics for Pediatric Symptom Checklist (PSC-17) Scales

Scale	*Range*	*M(SD)*
Total PSC-17	4-27	15.50(6.05)
Internalizing	0-10	4.00(2.60)
Attention	0-10	5.70(2.86)
Externalizing	0-13	5.37(3.65)
Preschool PSC	0-32	20.57(10.44)

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Table 6

Predicting Overall Mental Health from ACE Scores

		$CI_{95\%}$ for *b*			
Predictor	*b*	Lower	Upper	β	Sig. (*p*)
Child	13.50	11.47	15.52	.363	.008**
Teen	-.316	-1.219	.586	-.189	.466

Predicting Internalizing Symptoms from ACE Scores

		$CI_{95\%}$ for *b*			
Predictor	*b*	Lower	Upper	β	Sig. (*p*)
Child	.616	.240	.991	.496	.002**
Teen	.024	-.307	.354	.039	.881

Predicting Externalizing Symptoms from ACE Scores

		$CI_{95\%}$ for *b*			
Predictor	*b*	Lower	Upper	β	Sig. (*p*)
Child	.227	-.284	.738	.153	.373
Teen	-.394	-.927	.138	-.378	.135

Predicting Attention Symptoms from ACE Scores

		$CI_{95\%}$ for *b*			
Predictor	*b*	Lower	Upper	β	Sig. (*p*)
Child	.057	-.384	.497	.045	.794
Teen	.055	-.387	.496	.068	.496

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Figures

Figure 1

Adverse Childhood Experience Categories

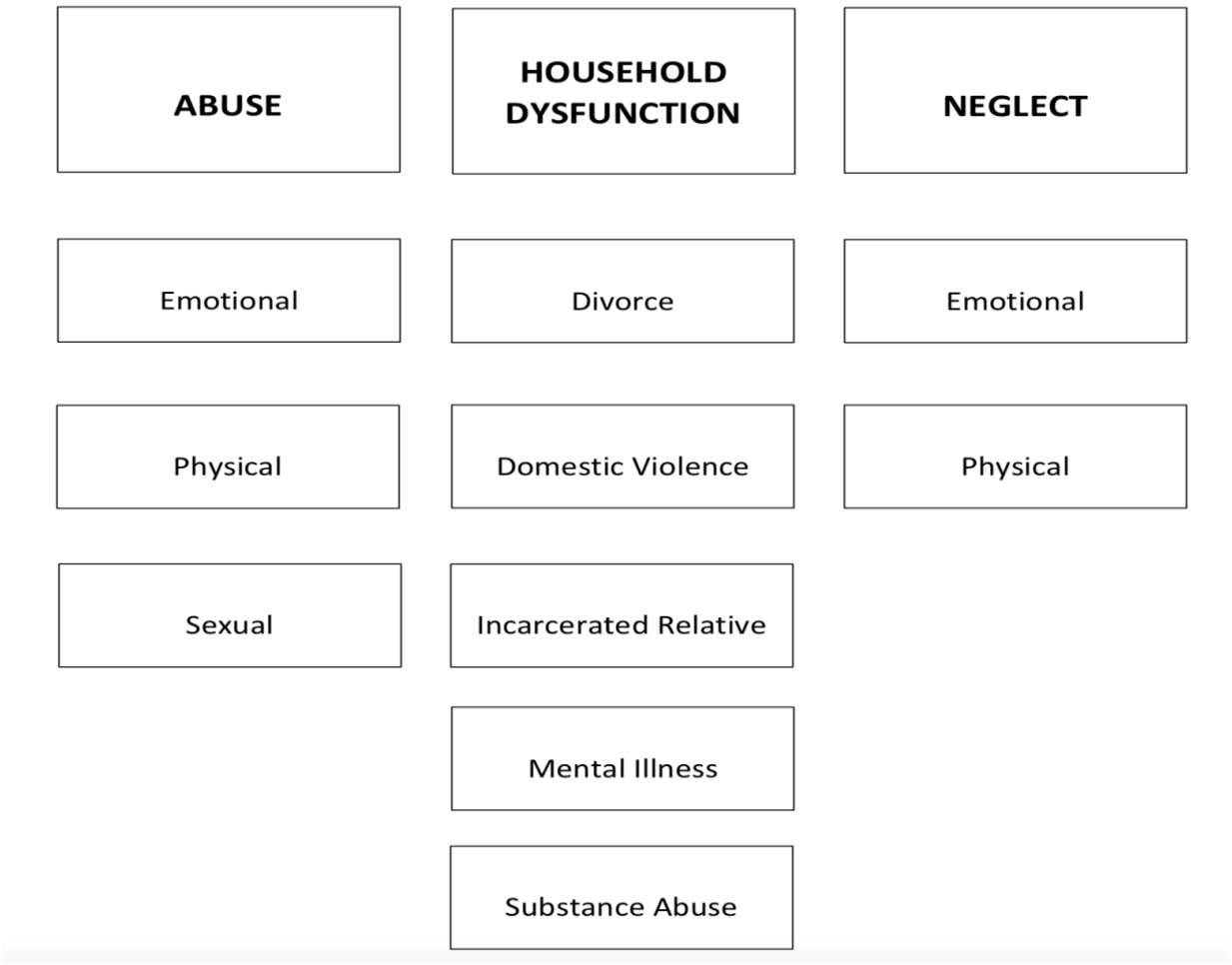

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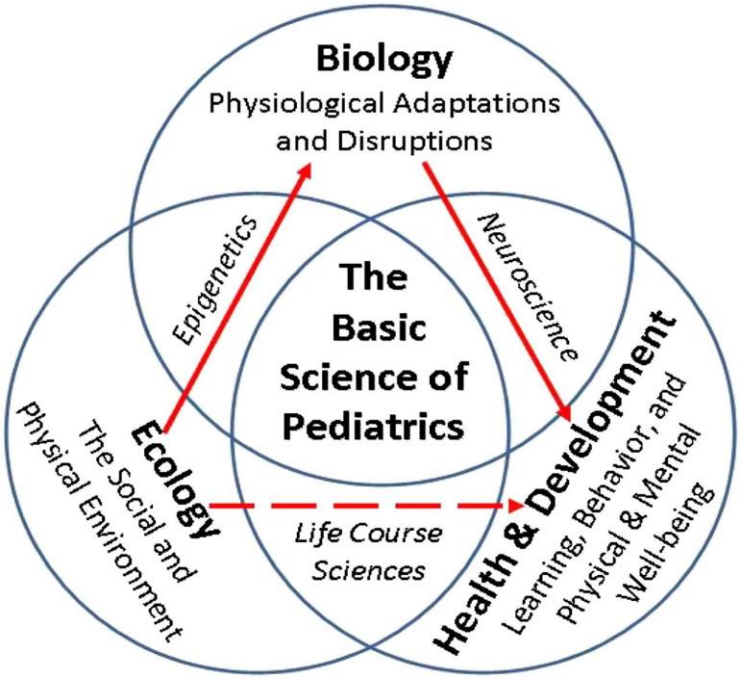
Figure 2

The Basic Science of Pediatrics



Note. Image credit: Shonkoff et al. (2012)

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Figure 3

Healthcare Utilization Path Analysis

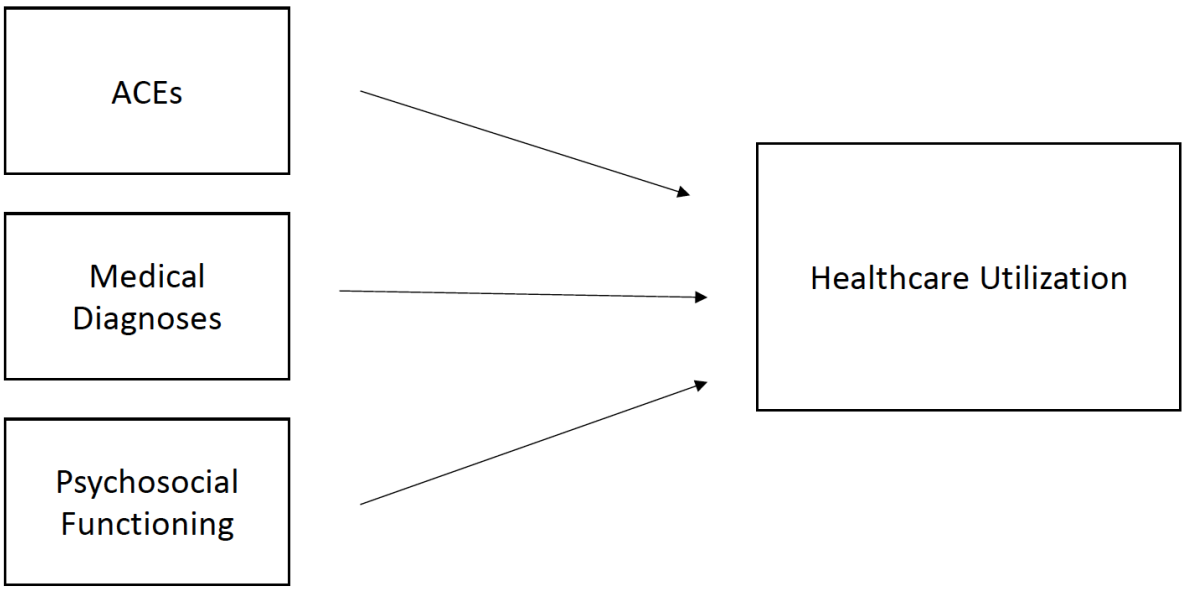

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Figure 4

Total number of ACEs reported by each participant

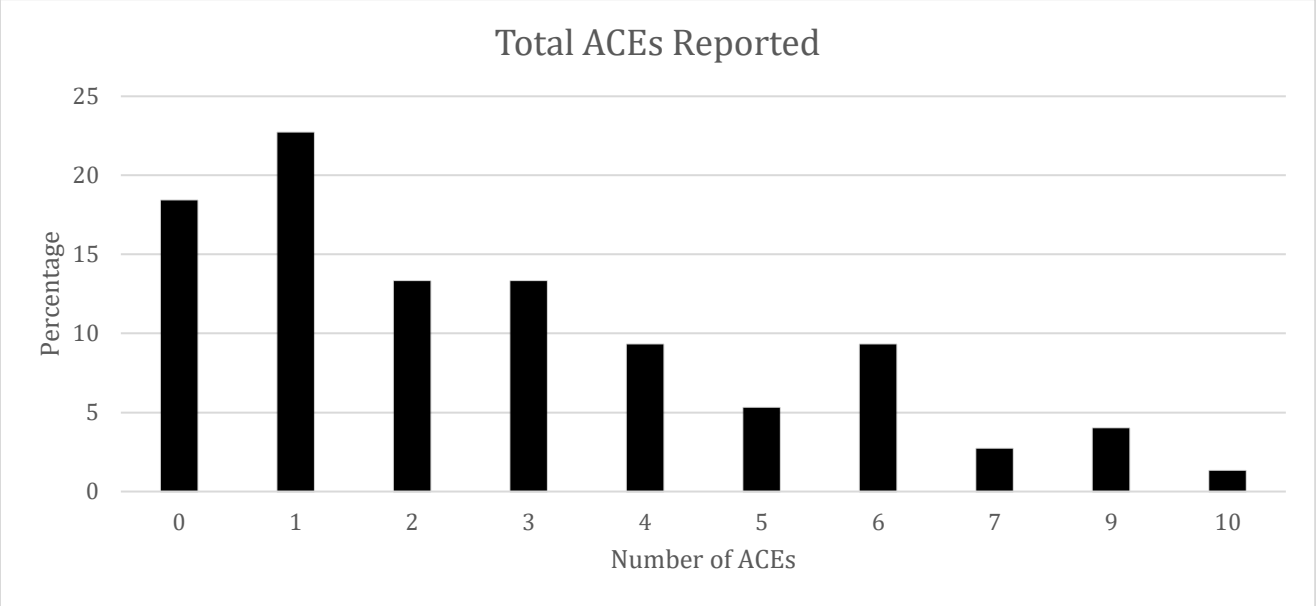

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Figure 5

Original ACEs in the Pediatric Sample

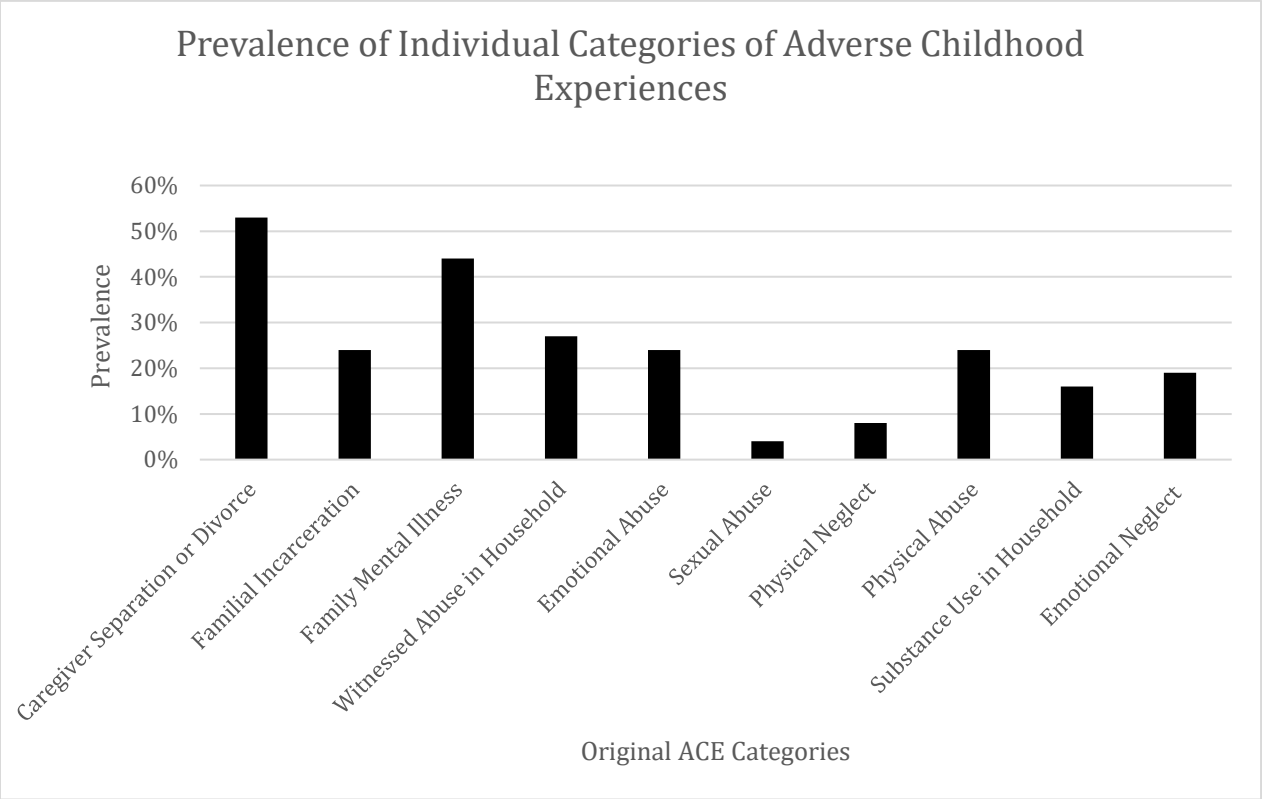

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Figure 6

Prevalence of Early Life Stressor ACEs in the Pediatric Sample

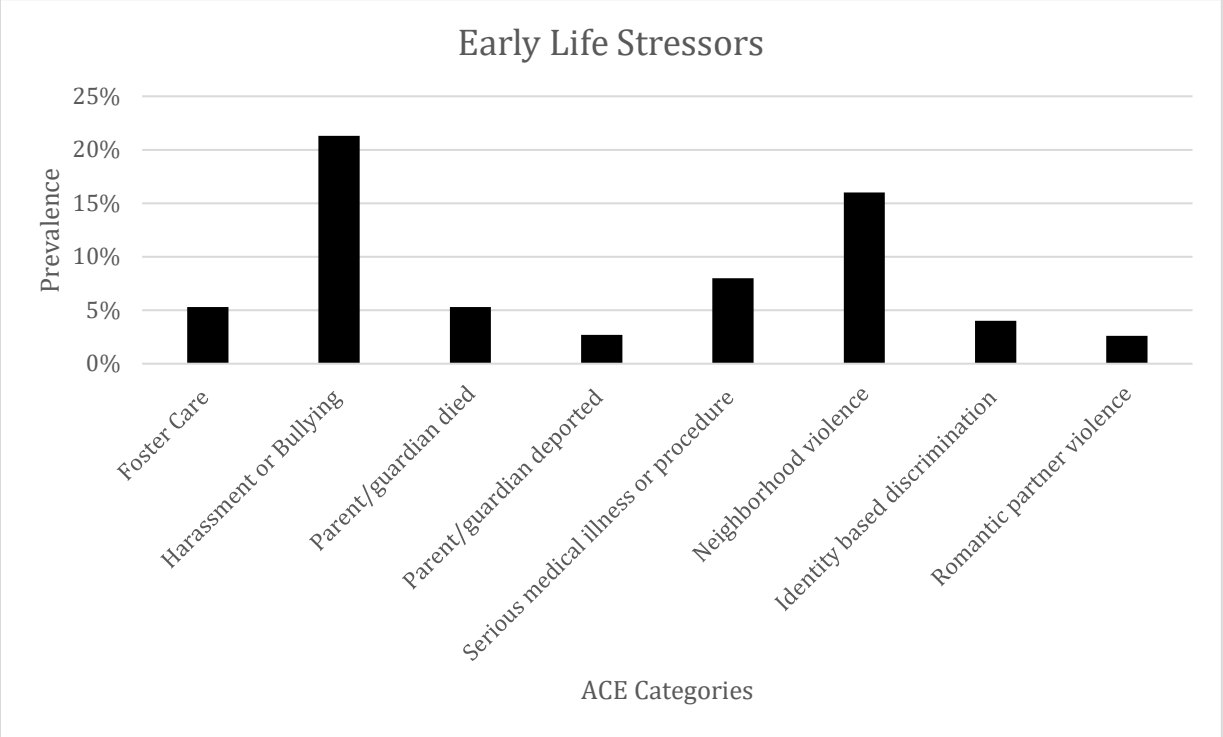

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Figure 7

Common Medical Diagnoses in Electronic Medical Records of the Sample

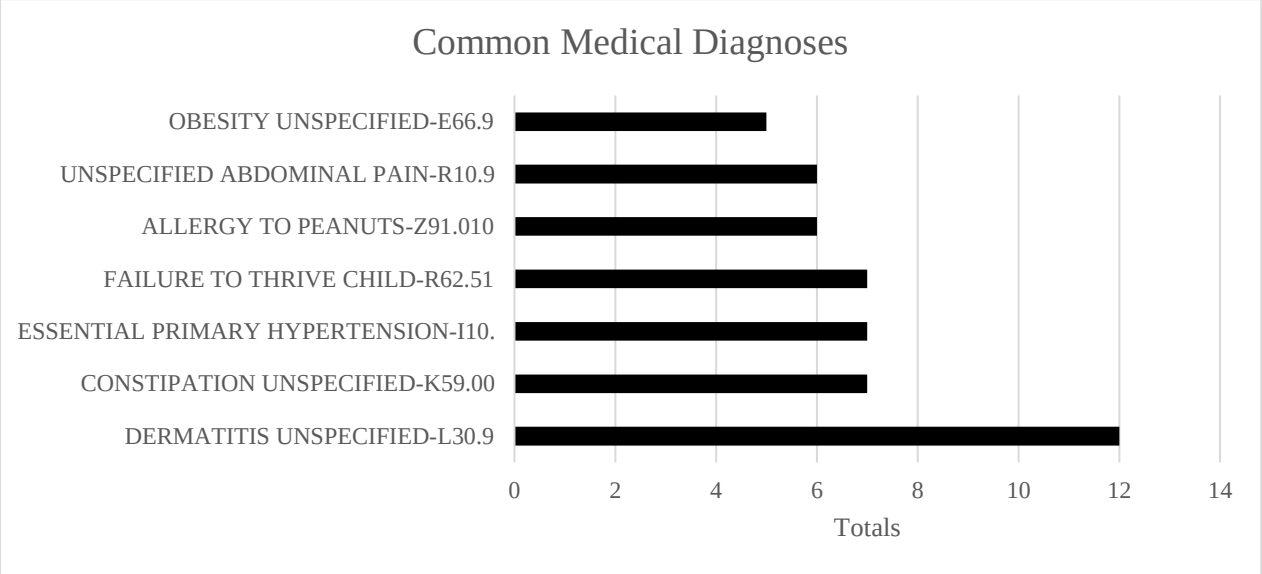

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Figure 8

Healthcare Utilization Path Analysis Results

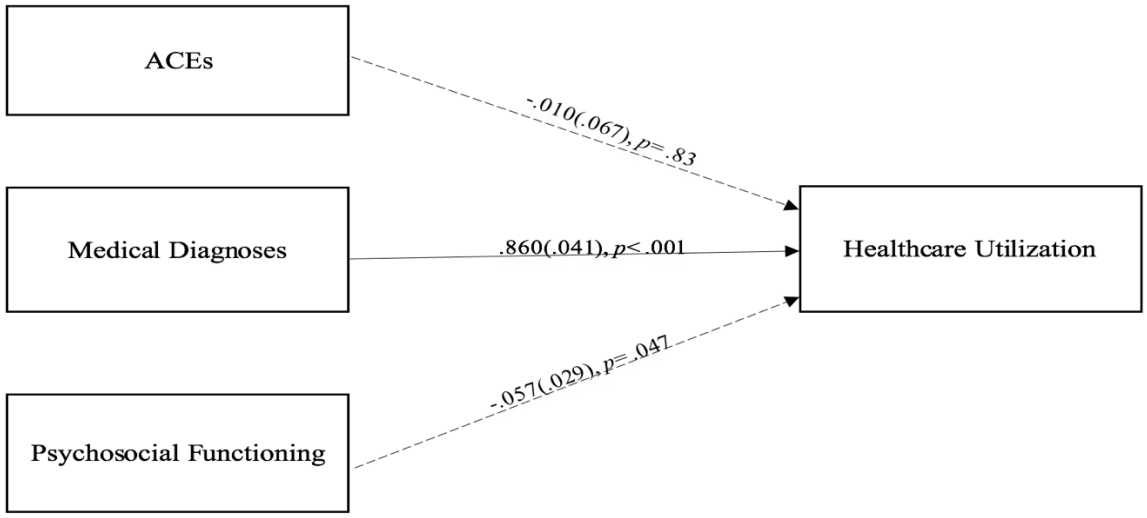

Figure 8. Relations between healthcare utilization, ACEs, medical diagnoses, and psychosocial functioning. Standardized coefficients shown outside parentheses; standard errors are shown inside parentheses. Dashed paths are non-significant.

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Appendix

CYW Adverse Childhood Experiences Questionnaire Teen (ACE-Q) Teen Self Report
To be completed by Patient

Today's Date: _____
Your Name: _____Date of birth: _____
Many children experience stressful life events that can affect their health and development. The results from this questionnaire will assist your doctor in assessing your health and determining guidance. Please read the statements below and place a mark in the box next to each one that applies. At the end of each section count the number of statements that apply to you and write the total number in the box provided.

1) Of the statements in Section 1, which apply to you?

Section 1. *At any point since you were born…*

- ❑ Your parents or guardians were separated or divorced
- ❑ You lived with a household member who served time in jail or prison
- ❑ You lived with a household member who was depressed, mentally ill or attempted suicide
- ❑ You saw or heard household members hurt or threaten to hurt each other
- ❑ A household member swore at, insulted, humiliated, or put you down in a way that scared you OR a household member acted in a way that made you afraid that you might be physically hurt
- ❑ Someone touched your private parts or asked you to touch their private parts in a sexual way that was unwanted, against your will, or made you feel uncomfortable
- ❑ More than once, you went without food, clothing, a place to live, or had no one to protect you
- ❑ Someone pushed, grabbed, slapped or threw something at you OR you were hit so hard that you were injured or had marks
- ❑ You lived with someone who had a problem with drinking or using drugs
- ❑ You often felt unsupported, unloved and/or unprotected

Write the total number in the box. ☐

2) Of the statements in Section 2, which apply to you?

Section 2. *At any point since you were born…*

- ❑ You have been in foster care
- ❑ You have experienced harassment or bullying at school
- ❑ You have lived with a parent or guardian who died
- ❑ You have been separated from your primary caregiver through deportation or immigration
- ❑ You have had a serious medical procedure or life threatening illness
- ❑ You have often seen or heard violence in the neighborhood or in your school neighborhood
- ❑ You have been detained, arrested or incarcerated
- ❑ You have often been treated badly because of race, sexual orientation, place of birth, disability or religion
- ❑ You have experienced verbal or physical abuse or threats from a romantic partner (i.e. boyfriend or girlfriend)

Write the total number in the box. ☐

CYW ACE-Q Teen Self Report(13-19 yo)

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CYW Adverse Childhood Experiences Questionnaire (ACE-Q) Child

To be completed by Parent/Caregiver

Today's Date: _____

Many children experience stressful life events that can affect their health and wellbeing. The results from this questionnaire will assist your child's doctor in assessing their health and determining guidance. Please read the statements below and place a mark in the box next to each one that applies. At the end of each section count the number of statements that apply to your child and write the total number in the box provided.

1) Of the statements in Section 1, which apply to your child?

Section 1. At any point since your child was born…

- ❑ Your child's parents or guardians were separated or divorced
- ❑ Your child lived with a household member who served time in jail or prison
- ❑ Your child lived with a household member who was depressed, mentally ill or attempted suicide
- ❑ Your child saw or heard household members hurt or threaten to hurt each other
- ❑ A household member swore at, insulted, humiliated, or put down your child in a way that scared your child OR a household member acted in a way that made your child afraid that s/he might be physically hurt
- ❑ Someone touched your child's private parts or asked your child to touch their private parts in a sexual way
- ❑ More than once, your child went without food, clothing, a place to live, or had no one to protect her/him
- ❑ Someone pushed, grabbed, slapped or threw something at your child OR your child was hit so hard that your child was injured or had marks
- ❑ Your child lived with someone who had a problem with drinking or using drugs
- ❑ Your child often felt unsupported, unloved and/or unprotected

Write the total number in the box. ☐

2) Of the statements in Section 2, which apply to your child?

Section 2. At any point since your child was born…

- ❑ Your child was in foster care
- ❑ Your child experienced harassment or bullying at school
- ❑ Your child lived with a parent or guardian who died
- ❑ Your child was separated from her/his primary caregiver through deportation or immigration
- ❑ Your child had a serious medical procedure or life threatening illness
- ❑ Your child often saw or heard violence in the neighborhood or in her/his school neighborhood
- ❑ Your child was often treated badly because of race, sexual orientation, place of birth, disability or religion

Write the total number in the box. ☐

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CYW Adverse Childhood Experiences Questionnaire Teen (ACE-Q) Teen

To be completed by Parent/Caregiver

Today's Date: _____

Many children experience stressful life events that can affect their health and wellbeing. The results from this questionnaire will assist our team in assessing their health and determining guidance. Please read the statements below and place a mark in the box next to each one that applies. At the end of each section count the number of statements that apply to your child and write the total number in the box provided.

1) Of the statements in Section 1, which apply to your child?

Section 1. *At any point since your child was born…*

- ❑ Your child's parents or guardians were separated or divorced
- ❑ Your child lived with a household member who served time in jail or prison
- ❑ Your child lived with a household member who was depressed, mentally ill or attempted suicide
- ❑ Your child saw or heard household members hurt or threaten to hurt each other
- ❑ A household member swore at, insulted, humiliated, or put down your child in a way that scared your child OR a household member acted in a way that made your child afraid that s/he might be physically hurt
- ❑ Someone touched your child's private parts or asked them to touch that person's private parts in a sexual way that was unwanted, against your child's will, or made your child feel uncomfortable
- ❑ More than once, your child went without food, clothing, a place to live, or had no one to protect her/him
- ❑ Someone pushed, grabbed, slapped or threw something at your child OR your child was hit so hard that your child was injured or had marks
- ❑ Your child lived with someone who had a problem with drinking or using drugs
- ❑ Your child often felt unsupported, unloved and/or unprotected

Write the total number in the box. ☐

2) Of the statements in Section 2, which apply to your child?

Section 2. *At any point since your child was born…*

- ❑ Your child was in foster care
- ❑ Your child experienced harassment or bullying at school
- ❑ Your child lived with a parent or guardian who died
- ❑ Your child was separated from her/his primary caregiver through deportation or immigration
- ❑ Your child had a serious medical procedure or life threatening illness
- ❑ Your child often saw or heard violence in the neighborhood or in her/his school neighborhood
- ❑ Your child was often treated badly because of race, sexual orientation, place of birth, disability or religion
- ❑ Your child experienced verbal or physical abuse or threats from a romantic partner (i.e. boyfriend or girlfriend)

Write the total number in the box. ☐

CYW ACE-Q Teen (13-19 yo)

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Pediatric Symptom Checklist-17 (PSC-17)

Caregiver Completing this Form: _____ Date: _____

Name of Child: _____

		Please mark under the heading that best fits your child			For Office Use		
		NEVER	SOME-TIMES	OFTEN	I	A	E
1.	Fidgety, unable to sit still						
2.	Feels sad, unhappy						
3.	Daydreams too much						
4.	Refuses to share						
5.	Does not understand other people's feelings						
6.	Feels hopeless						
7.	Has trouble concentrating						
8.	Fights with other children						
9.	Is down on him or herself						
10.	Blames others for his or her troubles						
11.	Seems to be having less fun						
12.	Does not listen to rules						
13.	Acts as if driven by a motor						
14.	Teases others						
15.	Worries a lot						
16.	Takes things that do not belong to him or her						
17.	Distracted easily						
	(scoring totals)						

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Vita

Irene A. Jacobs was born on June 4th, 1990 in Silver Spring, Maryland and is an American with Sierra Leonean lineage. She graduated from Sherwood High School in 2008 in Montgomery County, Maryland. In 2013, she received a dual Bachelor of Arts and Master of Arts in Psychology from Pace University in New York, NY. Following graduation, she taught psychology at colleges in the D.C. metropolitan area. She also worked as a research assistant at the Comprehensive Assessment and Intervention Program (University of Maryland, College Park) and the African American Knowledge Optimized for Mindfully-Healthy Adolescents Project (Georgetown University). Prior to starting her doctorate, she worked for the United States Department of Defense's Military Operational Medicine Research Program, contributing to the programmatic steering of psychological health and resilience research. She began her doctoral journey in clinical psychology in 2018 at Virginia Commonwealth University in Richmond, VA, mentored by Dr. Heather A. Jones.

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