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Adverse Childhood Experiences (ACES): Assessing Their Impact on Mental Health Outcomes Among US Children and the Mitigating Role of Resilience

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ABSTRACT

Adverse Childhood Experiences (ACES): Assessing Their Impact on Mental Health Outcomes Among US children and the Mitigating Role of Resilience

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ACEs are traumatic life events occurring during childhood that can have negative effects. Common mental disorders that are diagnosed in childhood are attention-deficit/hyperactivity disorder (ADHD), behavior disorders, anxiety and depression. The associations between ACEs and such problems in children have not been significantly examined. There are protective factors that can help reduce the effects of exposure to ACEs that have not been fully explored.

The purpose of this research study was to examine: 1) the prevalence of mental health outcomes in children; 2) the associations between ACEs, resilience and mental health outcomes; and 3) the role of resiliency as a moderating variable between ACEs and mental health outcomes. A secondary data analysis utilizing data from the 2018 National Survey of Children's Health (NSCH) was used to examine the proposed aims. The study population consisted of children between the ages of 3 and 17. Chi-square analyses were utilized, and logistic regression models were constructed.

Weighted prevalence estimates were calculated. 8.6%, 6.9%, 8.0% and 3.7% currently had ADHD, behavioral disorders, anxiety and depression. The prevalence of each disorder was higher for older age, Whites, public insurance, single parent homes or homes without parents, caregivers with mental health problems and non-users of medical home. Children exposed to 4 or

more ACEs had greater odds of ADHD (adjusted odds ratio [aOR]= 2.03; 95% confidence interval [CI], 1.52-2.72), behavioral disorders (aOR: 2.47; CI: 1.81-3.37), anxiety (aOR: 2.66; CI: 2.00-3.53) and the strongest relationship was seen with depression (aOR: 4.53; CI: 3.13-6.54). Individual resilience, family resilience and community resilience were associated with decreased odds of mental health outcomes and the strongest relationship was seen with individual resilience. There were significant interactions between exposure to ACEs and child resilience for ADHD (aOR: 0.14; CI: 0.08-0.23), current behavioral disorders (aOR: 0.10; CI: 0.06-0.16), anxiety and (aOR: 0.21; CI: 0.13-0.35) depression (aOR: 0.24; CI: 0.13-0.43) as well as significant interactions between ACE exposure and community resilience for depression (aOR: 0.25; CI: 0.10-0.61).

The findings of this research have implications for the improvement of mental health diagnosis, promotion of resilient measures and future research.

DEDICATION

This dissertation is dedicated to my family for their long-term support and encouragement.

ACKNOWLEDGEMENTS

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Chapter 1. Introduction

Statement of the Problem

Adverse Childhood Experiences (ACEs) are defined as various forms of abuse, neglect and family dysfunction or exposure to toxic stress occurring during childhood before age 18 that can create substantial impairment on the functioning of the children which also continue into adulthood (Felitti et al., 1998). An estimated 20% of children aged 3-17 years in the US experience a diagnosable mental illness in a given year (Centers for Disease Control and Prevention, 2020c). Mental health outcomes are chronic conditions that can continue into adulthood, interfere with the healthy development of children, and represent a significant burden to individuals and the society. Previous research has noted that ACEs are strongly associated with adverse mental health outcomes among adults. Research has also demonstrated that protective factors can exert a positive significant influence in decreasing the negative impact of ACEs on adverse health outcomes. However, further research is needed to understand observed relationships between ACEs and specific mental health outcomes in children as well as the potential moderating role of resilience or protective factors on observed relationships. This study examines these relationships in detail and findings will be important for informing the development of interventions to address these important issues among children and adolescents.

Background of the Problem

Studies have frequently shown that the environment and events that individuals experience during childhood and through adolescence have extensive effects on the health trajectory of their lives. Adverse childhood experiences (ACEs) are stressful occurrences and negative environments that an individual is exposed to before the 18th birthday, which are

harmful and associated with the development and prevalence of physical and mental health problems. A large body of research has demonstrated that ACEs, depending on severity and type, are linked to poor health outcomes and can create maladjustment issues that continue into adulthood.

The study of ACEs and long-term outcomes began with a study by Felitti and colleagues (1998) in a partnership between Centers for Disease and Control (CDC) and Kaiser Permanente. Researchers carried out a retrospective study which asked adults whether they experienced specific negative events during their childhood and examined the potential impacts of these events on health related factors (Felitti et al., 1998). This study also noted that ACEs (as measured by ACE scores) have a cumulative effect, with an increasing number of ACES being associated with a higher likelihood of negative health outcomes.

ACEs have been shown to have strong associations with mental health conditions while examining the comorbidity of physical, mental and developmental disorders (Bright et al., 2016; Hughes et al., 2017). Mental health problems are now being diagnosed in younger children, thus the need to examine younger populations (Ali et al., 2018; Kerker et al., 2015).

Resiliency can be conceptualized using various terms and those who are resilient have good health despite experiencing adversity. Additional studies have noted that positive experiences within the family or community support the well-being of youth. This study will explore different protective factors to evaluate whether they buffer the risk factors associated with ACEs. It is imperative to explore multiple different protective factors within the child's environment because any given child may only acquire a subset of protective factors (Moore &

N. Ramirez, 2016). Each of these factors can potentially mitigate the association between ACEs and mental health outcomes; moreover, the cumulative effect of many factors may be significant, not only statistically but also substantively.

This study will describe the proportion of children and adolescents who have mental health disorders as well as those who have experienced childhood adversities and the proportion of those who stayed healthy despite having experienced adversity. This research study has three goals: first, describing the prevalence of mental health disorder during childhood using a nationally representative sample. Secondly, assessing the association between the number of ACEs to which children have been exposed and their well-being on a variety of mental health outcomes. Thirdly, examining the extent to which individual, family and community resilient factors moderate the effect of ACEs on observed outcomes.

This chapter/dissertation provides a review of the work that has been conducted on the topic of ACEs and mental health outcomes. Included within the review is a discussion of the types of ACEs associated with poor health outcomes and subsequently a discussion of common mental health disorders in children that places them at higher risk for developing due to exposure to ACEs. The concept of resilience is also discussed. While all ACEs may not be preventable, recognizing their effects on the mental health in children can be a starting point to address these issues and improve the health and well-being of children and families. By examining resilient factors and thus protection against mental health disorders, this will add to the existing knowledge base and increase understanding. All studies in the individual manuscripts received ETSU IRB approval and were not considered as research involving human subjects.

Literature Review

Overview

Adverse childhood experiences (ACEs) are an important measure that reflects traumatic or stressful events (such as abuse, neglect and family dysfunction) that occur occurring during childhood. The relationship between ACEs and longer-term health outcomes, behaviors disease, cognitive impairment, and premature mortality has been well documented. However, the association between ACEs and more immediate mental health outcomes among children and adolescents is an important, yet understudied aspect of ACEs. Mental health outcomes among children and adolescents have important implications for social-emotional development, programs, and policy. Associations between ACEs and select mental health outcomes have been examined; however, the body of literature is relatively small and incomplete. Furthermore, one additional aspect of ACEs that is gaining more traction in the literature is that of resilience and the role of protective factors as a buffer between ACEs and longer-term health outcomes.

This review examines the historical origins of ACEs, including definitions and uses of ACE measures in previous research; provides an overview of mental health outcomes among adolescents and the potential role of ACEs in contributing to those outcomes; and explores the potential role of resilience or protective factors in mitigating potential relationships between ACEs and longer-term mental health outcomes among adolescents and children.

Prevalence of ACES

Original ACEs Study

Adverse Childhood Experiences (ACEs) are traumatic or stressful events such as abuse, neglect and family dysfunction occurring before 18 years which can lead to disease, unhealthy behaviors, cognitive impairment and premature mortality (Felitti et al., 1998). The seminal study by Felitti and Anda (1998) was the first major detailed study of childhood trauma exposure and its long-term health consequences under the ACEs framework. The study was conducted with adult participants and uncovered common prior harmful childhood experiences that contributed to negative health outcomes. The study was a collaborative effort between the Centers for Disease Control and Kaiser Permanente. The ACE questionnaire involved a sample of participants that were insured by Kaiser Health Plan and described seven categories of ACEs: sexual abuse, physical abuse, psychological abuse/neglect, parental mental illness, domestic violence, divorce and criminal behavior. The questionnaire has been used as the foundation for other subsequent ACE studies.

Over 50% of participants reported experiencing at least one ACE, 25% reported experiencing at least two ACEs and 6% reported experiencing at least four ACEs (Felitti et al., 1998). A dose-relationship between the number of ACEs and disease incidence or risk factors was observed. Study participants who experienced four or more categories more frequently experienced other problems such as drug abuse, alcoholism, poor-self rated health, sexually transmitted diseases, physical inactivity, severe obesity, physical inactivity, suicide and depression. Similar findings were also with diseases such as cancer, liver disease, heart disease and emphysema (Felitti et al., 1998).

Although the findings from the original ACEs study were groundbreaking, there were certain limitations. The study included primarily White, insured, middle-aged and educated participants. Additional studies have expanded on the study with new information which has resulted in changes to how ACEs are examined such as the extension of the types of ACEs, demographics, socioeconomic status, younger samples and the relationship of ACEs to adolescent and childhood outcomes.

More recent studies have included other stressful childhood events such as poverty, community violence and peer rejection with similar health outcomes to prior ACEs findings. Researchers have also shown that these additional events are important in estimating long-term outcomes in adults (Finkelhor, Shattuck, et al., 2015). The evidence for the inclusion of other ACEs is also based on several studies that examined socioeconomic status, peer rejection or violence in the community. Findings from the National Youth Survey Family Study noted an association between witnessing violence in the community and negative behavioral outcomes (Franzese et al., 2017). Low socioeconomic status was associated with increased risk of anxiety, depression and substance abuse in children (Melchior et al., 2007). Peer rejection has also shown to be related to psychopathological symptoms in adulthood (Wilson et al., 2015). In particular, lower socio-economic status, peer victimization and community violence are some variables that have overshadowed some of the traditional ACEs items within models that predict the health of adolescents (Finkelhor, Shattuck, et al., 2015). The lack of addition of exposure to poverty in the original ACEs study is notable. These studies lend support that other childhood adversities have negative outcomes across the lifespan particularly for diverse populations. These studies confirm that witnessing violence in the community, experiencing racial discrimination, low

socioeconomic status and peer victimization are associated with negative outcomes as well as validate the importance of the original ACE items (Cronholm et al., 2015; Wright et al., 2013).

Definitions and use of ACEs Measures in Research

In addition to expanding the categories of ACEs, various methods have been used to study ACEs. Whether examined individually or combined, each method has its strengths and limitations. The individual types of ACEs can be categorized and scored for comparison to subsequent manifestations of mental and physical health diagnoses. ACEs have a cumulative impact, such that as an individual experience more ACEs (usually referred to as an individual's ACE score), there is an increased likelihood of negative consequences. If an individual has experienced at least four ACEs, the probability of negative outcomes and the severity of such effects grow rapidly. Participants who experienced four or more ACE categories had a much higher increase in risk factors such as substance abuse, smoking, suicide, depression, physical inactivity and poor self-rated health as well as diseases such as heart disease and cancer. Also, there was a strong relationship between an individual's ACE score and the number of risk factors that were reported (Felitti et al., 1998). The seven categories of ACEs were also strongly related to one another, thus persons with several categories were more likely to have many health risk factors. For individuals reporting any single category of ACE, the likelihood of being exposed to any additional category was between 65% and 94%; and the likelihood of at least 2 additional ACEs was between 40-75% (Felitti et al., 1998). These findings indicate that the effect of ACEs is cumulative.

Most studies that examined the long-term effects of ACEs utilize a cumulative method analogous to the original study mainly due to the co-occurring nature of ACEs. This approach

has continued to be used in research due to repeated results showing higher ACEs scores lead to higher risks of negative outcomes. Youth with increased cumulative ACE scores have an increased risk of intrapersonal and interpersonal violence (Blum et al., 2019), chronic diseases and mental health (Chang et al., 2019) and decreased emotional health (Balistreri, 2015). Many studies examine the cumulative effects of ACEs rather than the individual effects because ACEs tend to cluster. The cumulative risk hypothesis postulates that it is the collective impact of risk factors or adverse childhood experiences, not any particular risk factor that negatively affect mental outcomes (Sameroff, 2000). Utilizing the count measure to score ACEs cumulatively remains commonplace in practice and research.

Demographics of Children who Experience ACES

The original ACEs studies noted that the prevalence of ACEs among the population was relatively high. However, these studies were conducted among largely white, middle class individuals. These findings suggest that overall prevalence of ACEs among more vulnerable populations may be even higher than what was previously observed. Studies that have focused on the characteristics of children with ACEs depict that children who experience adversities differ from children without such experiences in key areas. These variations may represent different ways that make children who have experienced ACEs vulnerable (Merrick et al., 2018). The association of these demographic characteristics with ACEs needs to be explored. The results from the original ACEs study revealed that about two-thirds of participants reported at least one ACE before 18 years (Felitti et al., 1998). Replications of this study revealed similar prevalence rates (Finkelhor, Turner, et al., 2015; Metzler et al., 2017). However,

sociodemographic diversity among these studies has been inadequate and this study will provide updated prevalence estimates.

Study of ACEs Using Younger Population

The study of ACEs among adults has certain limitations. Generally, data on ACEs have been retrospective, from respondents with an average age in the 50's and associate poor outcomes to a cumulative exposure rather than any one specific adversity. Identifying ACEs among children simultaneously rather than retrospectively among adults may enhance the capacity of caregivers and providers to mitigate the effects of exposure to ACEs via early identification and intervention, thereby reducing the possibility for negative outcomes for future generations (Schilling et al., 2007). The evaluation of current ACE exposure enables accurate recollection of events during childhood compared to decades after the events have occurred. Also, assessment of current prevalence rates may improve the capacity for researchers to evaluate the sequencing of life events (Finkelhor et al., 2013).

Former studies utilizing the National Survey of Children's Health or smaller samples have described parents' reports of ACEs experienced by their children (Caballero et al., 2017; Jimenez et al., 2017). However, few studies have recognized child and family characteristics that could affect the probability of exposure to ACEs. A recent study on the national prevalence of ACEs utilized adult respondent data (Merrick et al., 2018). Appraisal of the prevalence and factors contributing to ACEs in younger populations is required in order to create and implement programs and policies to assist families with children.

Summary

The effects of ACEs have been studied for many years and over time; the definition of ACEs has been expanded to include other traumatic experiences that may be associated with mental health or other outcomes in more vulnerable or diverse groups. ACEs have been studied using various methods; however; regardless of methodology, ACEs are linked to poor outcomes among children, although limited research has been conducted examining mental health outcomes particularly among children.

Prevalence of Mental Health Outcomes

The most common mental disorders that are diagnosed in childhood are attention-deficit/hyperactivity disorder (ADHD), behavior disorders, anxiety and depression (Centers for Disease Control and Prevention, 2020c). Mental disorders in children are a public health concern due to their early onset, effect on children, families and communities as well as prevalence. They can interfere with the ability of children to attain, cognitive, social and emotional milestones to function properly (Centers for Disease Control and Prevention, 2013). Also, they account for about $8.9 billion, which is the largest share of medical expenditure among all health problems that contribute to overall spending for child health care (Agency for Healthcare Research and Quality, 2015).

Most national surveys on mental disorders have focused on adolescents or did not evaluate multiple diagnoses. Recent trends suggest that even though the prevalence of certain childhood mental disorders have been relatively stable, several have increased. (Ghandour et al., 2019). Although it may be relatively rare to diagnose mental health conditions in younger

children, prior research regarding treatment has included preschool-aged children because the diagnoses and treatment of these conditions are complex. For example, it was discovered that preschoolers, particularly those without a diagnosis usually receive medications without complementary psychosocial intervention (Ali et al., 2018). The prevalence of specific mental disorders in children has implications for intervention efforts.

Social Determinants of Mental Health

The frameworks of social determinants focus on the circumstances in which individuals live that shape health outcomes (Marmot, 2005). A seminal review of social determinants using a multi-level framework revealed that disadvantaged and poor populations are most affected by mental health problems and that cumulative stress serve as mechanisms through which the effects of social determinants affect health across the lifespan (Allen et al., 2014).

Furthermore, unemployment has been routinely linked to psychological stress and it has been suggested that the impact is greater on men's health compared to women's health (Reibling et al., 2017). Studies have also shown that lower income was linked to poor mental health (Katz et al., 2018). Longitudinal studies suggest that persistent exposure to poor housing conditions and poor diet can negatively impact children's mental health (Rollings et al., 2017). Discrimination whether it pertains to race, occupational status or immigrant status has been associated with poor mental health outcomes (Berger & Sarnyai, 2015).

The relationships within the family can also affect mental health. Connection and satisfaction with one's family have been related to reduced depression (Mohammad et al., 2014). A history of neglect and abuse from a member of the family has been related to stress, anxiety

and aggression (Cecil et al., 2017). Community belonging, social support, emotional support, trust in other individuals and family/friend network size have been positively associated with mental health and described as protective factors against mental disorders (Alegría et al., 2018). Contemporary analysis on social determinants have shown that neighborhood safety measured by personal experience and beliefs are relevant predictors of mental health outcomes and rural area residents have a higher prevalence of mental disorders than urban residents (Alegría et al., 2018).

Factors that determine mental health outcomes in children include peer pressure, desire for increased autonomy, exploration of sexual identity, increased technology use, gender norms and media influence which can influence the disparity between the child's lived reality and perceptions for the future (World Health Organization, 2020). Some children have an increased risk of mental health disorders due to stigma, discrimination and lack of access to services. These include individuals with chronic illness, disabilities, neurological conditions, adolescent parents, and other discriminated groups (World Health Organization, 2020).

Attention-Deficit Hyperactivity Disorder (ADHD) and ACEs

Attention-Deficit Hyperactivity Disorder (ADHD) is a common childhood mental disorder, among US children, estimated to affect 9.4% of children aged 2-17 years (Centers for Disease Control and Prevention, 2020c). The diagnosis for this disease is based on the presence of pervasive and impaired levels of activity, impulsivity and inattention. About 5% of children have substantial difficulties that are below the threshold to achieve full diagnostic criteria (Sayal et al., 2018). ADHD usually persists into adulthood and individuals experience emotional

problems, antisocial behavior, self-harm, poor peer relationships, substance abuse, educational underachievement, psychiatric morbidity, and criminality (Jimenez et al., 2017). The estimated cost of childhood ADHD in the US ranges from 38 to 72 billion dollars annually (Doshi et al., 2012). Timely recognition and treatment of children with ADHD problems provide the opportunity to improve long-term outcomes.

ADHD and trauma are thought to be related. While, there is the evidence that children with ADHD may experience trauma more than children without ADHD, the research has mostly focused on clinical samples, with boys and children overly represented as having more severe ADHD and children with the inattentive subtype being excluded (Schilpzand et al., 2018). The scope of increased trauma exposure within community samples has not been established. It is also unclear whether the occurrence of trauma with ADHD is related to higher functional impairment in children compared to ADHD alone (Schilpzand et al., 2018)

Children with ADHD possess impulsive behaviors and have difficulties with self-regulation and thus, may have higher risk for exposure to trauma; however, the data on the prevalence of exposure to trauma within the ADHD population is insufficient and inconsistent. Wozniak et al. reported that 12% of a clinical study with 128 boys had ADHD compared to 7% of 110 boys without ADHD (aged 6-17 years) were exposed to at least one traumatic event (Wozniak et al., 1999). In contrast, a different study found that among a community sample of 629 persons, 76% of participants with childhood ADHD were exposed to a traumatic event (Lara et al., 2009). Given the common occurrence and indication of a relationship between ADHD and trauma exposure, it is vital to expand on this work by portraying the prevalence of such problems among other samples and evaluating their impact on child wellbeing.

Behavioral Disorders and ACEs

A behavior disorder or problem may be diagnosed when disruptive behaviors are displayed such as when children are aggressive, argue, act angrily or defiant towards adults. Other examples also include breaking rules, stealing or even damaging the properties of others intentionally (Centers for Disease Control and Prevention, 2020b). These behaviors are typically rare for the child's age at the time, persist for a longer time or are severe. These disorders are usually called externalizing disorders because they involve acting out and displaying unwanted behavior towards others (Centers for Disease Control and Prevention, 2020b). Despite the increasing literature, the proximal impact of ACEs on behavioral problems during middle childhood has not been well studied. Childhood adversity has been linked to a variety of problems in adulthood, but whether ACEs predict behavioral disorders during childhood has received less empirical attention (Hunt et al., 2017). Internalizing and externalizing problem behaviors have been shown to have a higher probability of arising after being exposed to adversity during childhood. A study that examined ACEs among a pediatric population, found that being exposed to 4 or more ACEs was linked to 33 times the probability of having a behavioral or learning problem compared to children who have not been exposed to ACEs (Burke et al., 2011). Other studies show significant increase in behavioral or attention problems among children after cumulative exposure to ACEs (Jimenez et al., 2016). These studies indicate that cumulative adversity is associated with behavioral problems in children.

Anxiety and ACEs

Health anxiety can be described as excessive concern about one's health and is believed to emerge from the misinterpretation of sensations in the body to indicate a serious illness.

Examples of various types of anxiety disorders include separation anxiety (being away from parents), phobias, social anxiety (fear of school or places with people), and panic disorders which are repeated periods of sudden intense fear (Centers for Disease Control and Prevention, 2020a). These concerns are resistant to elimination and continue despite relevant medical reassurance of good health (Reiser et al., 2014). Severe anxiety can lead to significant distress and individuals with severe anxiety use resources in ways that are expensive for the health care system (Barsky et al., 2001). Accordingly, it is imperative to identify persons who may be at risk of developing this condition to prevent unwarranted use of resources and provide appropriate services.

There is a relative lack of research examining the relationship between anxiety and childhood adversities. A limited number of research have evaluated severe anxiety (often diagnosed as hypochondriasis) in adults having a history of family dysfunction and childhood abuse (Reiser et al., 2014). Patients with hypochondriasis usually report a history of adversities during childhood, including having a parent with a substance abuse problem compared to patients without hypochondriasis; however, there were no disparities seen for reports of childhood physical abuse, sexual abuse and parental separation (Noyes et al., 2002). However, Barsky et al. (2001), found that patients with hypochondriasis had significantly experienced physical and sexual abuse in childhood compared to patients without hypochondriasis. Research on anxiety and ACEs has been largely restricted to a categorical examination of the effects of ACEs (i.e. examining each ACE item independently), and in ways that have not allowed for a cumulative examination of various types of ACEs (Reiser et al., 2014). To a large extent, research has focused on the impact of ACEs on anxiety in adulthood but this relationship during childhood and adolescence is not well understood (Elmore & Crouch, 2020).

Depression and ACEs

Depression may be diagnosed in children when they feel persistent sadness or hopelessness and uninterested in things they enjoyed. Other symptoms include loss of attention, feeling worthless, restlessness and changes in sleep or eating patterns (Centers for Disease Control and Prevention, 2020a). Depression is mostly reported as occurring alongside with post-traumatic stress disorders in children, but its prevalence among children or adolescents exposed to trauma is not well understood. Depression during childhood and adolescence is an important area of study for many reasons. Depression is a leading cause of disability worldwide and re-occurs frequently during adulthood as well as increases the risk of long-term negative effects (Gore et al., 2011; Thapar et al., 2012). In a longitudinal study which compared mental health outcomes in adults between depressed and non-depressed individuals, depressed adolescents had a five-fold increase of attempting suicide 10-15 years later and were at risk for more depression throughout their life as well as increased medical and psychiatric hospitalizations (Weissman et al., 1999).

Despite the substantial burden that depression poses worldwide, there are no dependable measures of the extent to which depression affects children or adolescents that have been exposed to trauma (Vibhakar et al., 2019). Prior studies that examined ACEs and internalizing behaviors during childhood did not evaluate depression and anxiety separately. Only a small number of studies have evaluated whether exposure to ACEs differentially affects the outcomes of depression and anxiety (Elmore & Crouch, 2020). Depression and anxiety can occur as comorbidities but the causal factors and symptoms for each disease can be different and thus relationships with ACE exposures may also have differences (Centers for Disease Control and

Prevention, 2020c). Examining this disorder can yield important benefits for children exposed to trauma such as ascertaining the extent of the problem and identifying the impact of depression on trauma-exposed children early in order to highlight what type of resource many be needed to address this issue.

ACEs are most times interrelated and the examination of multiple ACEs allows for the evaluation of a graded relationship whereby the effect of a stressor is linked to the level of exposure on a continuous scale. While a large portion of this research has been done in adults with retrospective reporting of exposure during childhood, comprehending the biological pathway between early trauma and mental health outcomes requires examination of the immediate health consequences of ACEs during childhood. As such, it is necessary to identify early manifestations of ACEs especially among persons incurring many ACEs earlier in life.

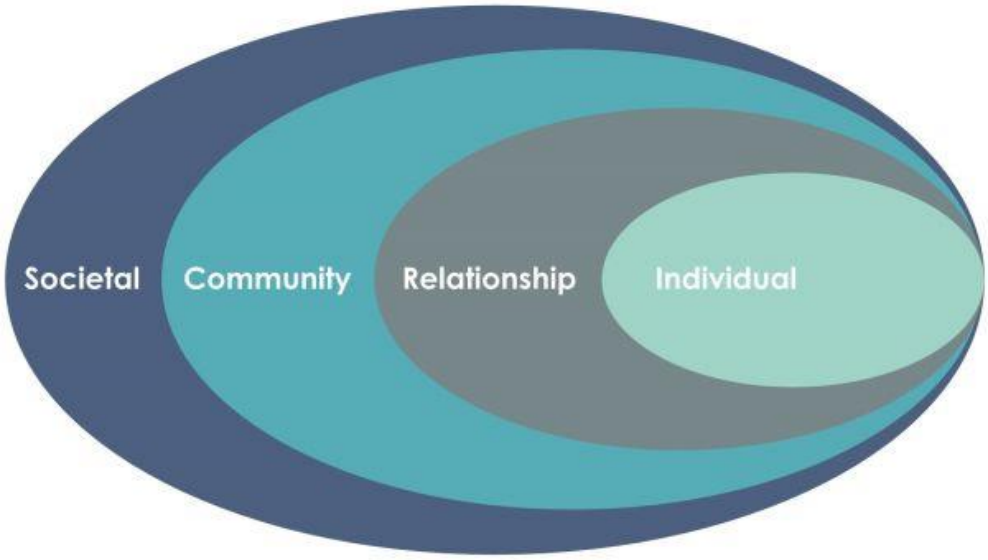
Mental Health Theoretical Framework

The determinants of mental health problems include individual, social and community factors and their interaction with each other. Thus, the need to understand mental health issues from various perspectives in order to prevent mental health disorders (Kendler, 2008; Sturgeon, 2006). The primary role of the family and societal or community factors to protect and promote good mental health implies that a multilevel conceptualization of determinants is relevant. Based on Bronfenbrenner's theory, the ecological model acknowledges multiple levels of influence such as the individual, interpersonal, community and society and thus enables targeting various levels to prevent negative outcomes. Instead of focusing on an aspect of childhood mental health such as the chemical structure of the brain, the ecological model proposed by Bronfenbrenner

accounts for the inter-related factors that affect the mental health of children (Eriksson et al., 2018). An ecological perspective provides a way to simultaneously focus on both individual and contextual systems and the relationships between these two systems.

The bi-directional impact of family and the individual's mental health has been emphasized severally within a recovery framework. The relational recovery for any given individual involves familial roles, which provide important connections. The notion of individualism has been challenged through the focus on social interactions or interpersonal network as the medium through which the mental health of an individual is studied (Price-Robertson et al., 2017). Research has shown that the social, environmental and policy contexts influence mental health in children. Bronfenbrenner depicted these influences as a series of layers where the innermost layer represents the individual, surrounded by the social environment such as relationships and embedded within community or physical environment which is also embedded within the policy environment (Bronfenbrenner and Evans, 2000; Denning et al., 2014). Increasing access to care in a medical home for children with special needs has been identified as priority for child health policy by the American Academy of Pediatrics (AAP), as well as other national organizations (American Academy of Pediatrics & Medical Home Initiatives for Children With Special Needs Project Advisory Committee., 2002). There are a number of versions of the social ecological model which may use different classifications but for the purpose of mental health, the model is made of the individual, relationships or family members, and community or societal factors such as policies as shown in the diagram below (Reupert, 2017).

Figure 1. Social Ecological Model. Adapted from 'Social Ecological Model: A Framework for Violence Prevention', by Centers for Disease Control and Prevention, 2020, Retrieved from www.cdc.gov/violenceprevention/publichealthissue/social-ecologicalmodel.html . Reprinted with permission



The Mitigating Role of Resilience

While the evidence appears to support the concept that ACEs can be linked to the development or exacerbation of various negative health outcomes at early stages, and as researchers continue to clarify a definite pathway during these early states, there is the need to determine ways to address these concerns. In tandem with this direction towards addressing ACEs, much attention has been set on the concept of resilience and the recognition of protective factors in reducing the health consequences of exposure to ACEs. Discerning why some children with ACE scores do not develop adverse mental health outcomes can provide insight into how

public health professionals can create effective strategies to reduce the dangerous effects of ACEs.

In the effort to provide more information about possible protective factors for children who have been exposed to ACEs, this study aims to identify likely factors in the child's life, family and environment that could contribute to the concept of resilience and assist in mitigating any association with negative mental health outcomes observed among children who have high ACEs scores. Given the limitations of some sociodemographic factors and the difficulties related to making major behavioral changes, this study will aim to identify easily modifiable and accessible factors.

Resiliency Theories

Although the consequences of ACEs may seem disparaging, protective factors exist that help to improve resiliency and decrease the effects of exposure to ACEs. Not every child who experiences ACEs has poor long-term outcomes and children may be able to cope successfully with these experiences and alter their life trajectories from that of potentially negative health outcomes to more positive outcomes (Center on the Developing Child at Harvard University, 2016). The process by which adversity can be overcome is referred to as resilience. The focus of resilience is on promotive, positive situational, individual or social characteristics which serve as protective factors that can interrupt the negative life course (Zimmerman, 2013).

The concept of resilience has been described using various terms, which will be discussed in the following paragraphs; however, this study will utilize the term resilience as a broad term to describe these conditions that serve as buffers from the long-term effect of ACEs and help

children overcome the toxic stress associated with ACEs. Flourishing or thriving has been defined as the building block of positive functioning as well as behavioral well-being (Kwong & Hayes, 2017). Aspects of flourishing for younger children include healthy relationships, curiosity in learning, capacity to regain equilibrium and expressions of happiness (Child Trends, 2013). Qualities of flourishing for older children include personal beliefs, positive relationships and specific task characteristics such as initiative or diligence (Child Trends, 2013). A systematic review identified six overlapping characteristics used to describe flourishing: competence, self-esteem, engagement, positive relationships, meaning and positive emotion. Engagement and meaning were common to the flourishing models (Agenor et al., 2017).

Positive childhood experiences which is another term that can used to describe resilience has been described as feeling safe in one's family to discuss emotions and difficult issues as well as feeling supported during difficult times. Examples of such experiences include ability to discuss openly with a family member about one's feeling, beliefs that one's family stood by them during hard times and protection by an adult within the home (C. D. Bethell et al., 2014). Positive childhood experiences as informed by the research are conceived as important, interdependent experiences that involve the child and the parent to attain the designated health outcomes and are organized into four broad categories: living in supportive and caring relationships, being in safe, equitable and protective environments, having options for constructive social engagement and connections as well as learning emotional and social skills (Sege & Harper Browne, 2017).

Resilience does not evolve by avoiding risk but by increasing the application of these protective factors. There will be an increased strength to endure adversity by engaging these

protective factors when facing such situations. These factors support resilience, inhibit risk factors and aid in modifying responses to adverse events (Benzies & Mychasiuk, 2009). Resilience combines different protective factors and the degree of importance of each factor is hard to predict, just like the degree of impact of the risk factors is often difficult to predict (Afifi & MacMillan, 2011). Resilience encompasses a favorable pattern of adaptation whenever there is adversity. Two criteria must be met in order for a child to be considered resilient: the presence of adversity or a threat and the state of adaptation and activity despite the threat (Masten & Obradović, 2006). The child must exhibit external adaptation skills when it comes to adaption in school and if the child exhibits physical health or mental well-being, then he or she has possessed the required internal adaption skills (Masten & Obradović, 2006).

Furthermore, resilience has been operationally defined by the assessment of indices of adverse or traumatic events and measurement of cumulative risk that combines risk factors (Masten, 2001). Research has shown that risks usually occur together and the accumulation these risks are associated with an increase of poor outcomes related to psychopathology, psychosocial competence and health. (Masten & Tellegen, 2012). Very often, children experience adversity within environments that do not provide protections of opportunities, basic resources and experiences that can nurture the growth of adaptive systems (Masten, 2001). If the end result of adversity is to weaken basic systems that protect them, efforts should be made to promote resilience in children who have experienced adversity by focusing on strategies to provide restoration or protection.

Resilience Theoretical Framework

The theory of risk and resilience examines the creation of an environment that enables individuals who have experienced adversity to be successful despite adversity and provides evidence that individuals are able to overcome if they have sufficient protective factors (Greene et al., 2004). According to the socio-ecological model or framework for resilience, families are made of persons who interact across different levels within a socio-ecological system. Overall, there were 24 factors that were identified according to this model across the individual, family and community levels and table 1 below presents the factors that were shown to foster resilience among the three levels (Benzies & Mychasiuk, 2009).

Table 1.1

Factors that Foster Resilience According to the Socio-Ecological Model

INDIVIDUAL	FAMILY	COMMUNITY
• Internal Locus of Control	• Family Structure	• Involvement in the community
• Emotional Regulation	• Intimate Partner Relationship Stability	• Peer acceptance
• Belief Systems	• Family Cohesion	• Safe neighborhoods
• Self-efficacy	• Supportive parent-child interaction	• Access to quality schools, childcare
• Effective coping skills	• Stimulating environment	• Access to quality health care

• Increased education, skills& training	• Social support
• Health	• Family of origin influences
• Temperament	• Stable and adequate income
• Gender	• Adequate housing

Also, research has shown that self-esteem, intelligence and temperament are individual factors, caring systems and close relationships are family factors and churches or schools are societal supports (Morrow, 2001). Some protective factors such as sense of meaning, family characteristics, intelligence and personal competence are important for individuals to overcome the effects of chronic and cumulative adversity (Morrow, 2001). Resilient individuals have also been shown to have a close relationship with at least one caregiver and favorite teachers were found to fulfill positive roles in the lives of children (Morrow, 2001). There is a higher probability of improved outcomes given these protective factors of resilience.

ACEs and Resilience

Bethell and colleagues used the National Survey of Children's Health to examine the prevalence of ACEs, relationships between them and the factors related to the development and lifelong health of children (C. D. Bethell et al., 2014). The results showed that children with two or more ACEs were 2.7 times more likely to repeat a grade when compared to children without ACEs and children without ACEs were 2.6 times more likely to be engaged in school when compared to children who had two or more ACEs (Bethell et al., 2014). The results also revealed

that resilience neutralized the impact of ACEs on school engagement and grade repetition. Children who demonstrated resilience were 1.55 times more likely to engage in school activities and 50% less likely to repeat a grade compared to children who did not demonstrate resilience (Bethell et al., 2014). The study concludes that developing resilience in children who experienced ACEs could potentially mitigate the negative impact of ACEs. The cross-sectional study design was stated as a limitation that did not enable the authors to establish a temporal sequence between health outcomes, school engagement and ACEs (Bethell et al., 2014).

Bethel and colleagues also examined the relationships between the prevalence of emotional, mental, or behavioral conditions, ACEs and protective factors that can be moderated using mindfulness-based approaches such as parent-child engagement, child resilience (described as the ability to remain calm in stressful situations) and parental coping. They were able to identity family attributes related to increased resilience among children with high ACE scores and emotional, mental, or behavioral conditions. The findings showed that parental engagement and child resilience weakened the impact of ACEs and encouraged the use of mindfulness-based and family-centered approaches to deal with traumatic issues and possibly interrupt the intergenerational cycle of ACEs and emotional, mental, or behavioral disorders (Bethell et al., 2016). The findings from the study emphasized resilience and the quality of family relationships. Prior salutogenesis approach regarding high ACE exposures has identified education, social support and physical activity as important protective factors (Dube et al., 2013).

Increasing the number of protective factors has shown to neutralize the effect of ACEs. Research has suggested that schools should adopt changes that enable a culture that is sensitive to children with many ACEs in order to increase resilience and improve the performance of

children (Burke et al., 2011). Teaching skills that bolster children's social skills, engagement skills, determination skills and providing supportive relationships with adult mentors who model success will enable children to succeed (Blodgett, 2016). Resilience has been shown to significantly impact overall school performance and academic achievement (Blodgett, 2016).

According to a recent article, the variables that could decrease the prevalence of depression after being exposed to trauma are not well known (Vibhakar et al., 2019). However, an article by Elmore and colleagues examined the association between exposure to ACEs, positive childhood experiences and depression. They found that the lack of resilience measures such as the emotional competence of a child and being in a safe and stable environment were associated with depression among children and adolescents and the presence of positive childhood experiences could reduce the severity of depression. Among children with 4 or more ACEs, the odds of depression were reduced by fourfold due to child resiliency (Elmore et al., 2020) .

Positive childhood experiences and associations with depression, poor mental health days, and social and emotional support in adults, independent from ACEs have also been examined. The study found that adults who reported higher positive childhood experiences had lesser odds of depression or poor mental health and greater support after accounting for ACEs. These associations were also stable after controlling for social and emotional support (Bethell et al., 2019).

The prevalence and indicators of flourishing among US children between the ages of 6 and 17 have also been examined. A three-item index indicated that school-age children were

flourishing if three conditions were met: curiosity and interest in learning new things, persistence in finishing tasks, and regulating emotions when faced with a challenge. Family resilience was also assessed through a four-item index that included how families responded when faced with problems, how ideas are shared or discussed within the family regarding important matters and how parents coped with the demands of raising their children (Bethell, Gombojav and Whitaker, 2019). The study found that only 40% of children were flourishing. Similarly, strong associations of resilience and flourishing were found for children across levels of health status, household income and exposure to ACEs (Bethell et al., 2019). These findings suggest that evidence-based programs and policies to promote family resilience and parent-child connections could improve flourishing in children.

The relationship between adverse family experiences and the ability for a child to flourish has been examined. The study suggested that participating in work, volunteering or extracurricular activities may provide alternative ways for children to develop positive relationships and roles. Positive social connections may enable youth to define their identities, provide a sense of belonging and relevant opportunities to learn beneficial adaptive responses towards adverse experiences. Thus, adopting these coping behaviors can contribute to long-term resilience, and decrease the risk of adverse health outcomes such as mental disorders and reduce the potential for long-term effects (Kwong & Hayes, 2017).

The relationship of protective factors such as safe, stable and nurturing relationships, self-reported physical and mental health and ACEs has been examined. Potential moderators of ACEs and poor health outcomes were assessed by protective factors. Study participants exposed to 4 or more ACEs who lived with an adult that made them feel protected were less likely to disclose

recurrent poor mental health. The moderating effect of safe, stable and nurturing relationships were presented. Exposure to long- term adverse health or constant mental distress and 4 or more ACEs were moderated by having access to an adult who made the participant feel safe during childhood or ensured their basic needs were provided most or all of the time during childhood (Crouch, Radcliff, et al., 2019).

There is a deficit of studies examining community levels of resilience. Validated tools measuring childhood resilience assets within the community or one that has been utilized in surveys nationally were not found. This has also been noted by other authors (Bellis et al., 2018).

Research evaluating the effect of resilience on children exposed to adverse events is limited (Gartland et al., 2019). Future studies on resilience among survivors of childhood trauma are needed to in order to comprehend the effect of these adverse effects and improve functioning for these individuals (Howell & Miller-Graff, 2014). An expansion of prior work will be conducted to examine risk factors related to grouped categories of ACEs, rather than counts, and analyze key individual, family and community factors of resilience.

Summary

ACEs have been shown to be significantly associated with mental illness. Despite its theoretical importance and the number of studies assessing the association between ACEs and mental health outcomes, this connection in children and adolescence is less understood and most prior studies have had a narrow focus on specific forms of ACE. Single types of ACEs may not necessarily increase the risk of developing mental health disorders, but it could be the accumulation of various ACEs that is responsible for the development of mental health

problems. Also, mental health issues have been assessed together rather than separately. The socioecological model provides a conceptual framework to understand the multiple protective factors of resilience as well as mental health issues. Examining these factors at the individual, family and community levels will afford a comprehensive approach to understanding how resilience influences the effects of exposure to ACEs.

Purpose of Research

This study builds on prior research by recognizing that children who have experienced ACEs are a vulnerable population who are at risk of mental health problems. The current study aims to address gaps in the literature for children within the United States by providing recent nationally representative estimates of common mental health disorders that are diagnosed in childhood such as attention-deficit/hyperactivity disorder (ADHD), behavior disorders, anxiety and depression and evaluating their association with ACE scores as a cumulative measure. A wide range of mental health problems is assessed within this study, thereby adding relevant findings to the current state of research. Furthermore, the association between cumulative ACE exposures with each mental health outcome will be examined to assess each outcome separately. This study aims at providing further empirical evidence for this association among young individuals rather than adults and covers a broader range of ages than other studies. The study also examines the moderating effect of resilience on children by using a theoretical framework that incorporates not only child and family resilience, but childhood community resilience assets as well.

Identifying, understanding and fostering protective factors can help to reduce the impact of ACEs. Understanding why certain children with ACEs do not experience negative mental health outcomes can enable the development of effective public health interventions. This can reduce the effect of trauma on the life course and impact young persons as such a critical phase of development as they transition into adulthood by focusing on intervening in young children.

Study Aims

The aims of this study are to:

1. Determine the national prevalence of currently diagnosed mental health problems (Attention-Deficit Hyperactivity Disorder (ADHD), behavioral disorder, anxiety and depression) among children aged 3-17 years in the US using data from the National Survey of Children's Health (NSCH). Mental health outcomes will be examined relative to individual, parental, and community or societal contexts of interest and the relationships between mental health outcomes and various sociodemographic factors will be explored.

2. Examine the associations between ACEs, resilience, and mental health outcomes (ADHD, behavior disorders, anxiety and depression) in children nationally. Correlates between the cumulative number of ACEs, specific ACE measures, and measures of resilience with each mental health outcome will be examined. Resilience measures and mental health outcomes will be examined in the context of individual, family, and community characteristics.

3. Examine the extent to which resiliency moderates the relationship between ACEs and mental health outcomes (ADHD, behavior disorders, anxiety and depression) in children within the US. The moderating effect will be examined in the context of individual, family, and community measures.

Chapter 2. National Estimates of Mental Health Outcomes Among Children & Adolescents

Abstract

Introduction: The purpose of this study was to determine the national prevalence and correlates of currently diagnosed attention deficit/hyperactivity disorder (ADHD), behavioral problems, anxiety and depression among U.S. children aged 3–17 years.

Methods: Data from the 2018 National Survey of Children's Health (NSCH) was analyzed. Parents/caregivers reported whether their children currently had each mental health condition. Chi square analyses and multivariate logistic regressions were utilized to examine the prevalence of conditions and assess independent associations based on selected sociodemographic characteristics which were categorized based on the socio-ecological model for mental health.

Results: Weighted prevalence estimates were calculated for the study population (*n* = 26,572). Our study found that 8.6% currently had ADHD, 6.9% currently had behavioral disorders, 8.0% currently had anxiety and 3.7% currently had depression. The prevalence of each disorder was higher for older age, Whites (except for behavioral disorders which were higher for Blacks), public insurance, single parent households, children living with non-parents, parent/caregiver mental/emotional health, and non-users of medical home when comparing individuals who had these disorders to those without the disorders. Condition-specific variations were observed. Children with public and private insurance, single parents/non-parents, mentally ill parents and not receiving care in a medical home were more likely to be diagnosed with mental health disorders.

Conclusion: These findings provide the latest data on a broad range of mental health disorders in a nationally representative sample of U.S. children and adolescents and show that these problems

are prevalent which highlight the need for prevention and early intervention. The redesigned NSCH can be used to monitor diagnosis patterns for these disorders.

Keywords: prevalence, mental health disorders, characteristics

Introduction

Mental health disorders in children can be described as critical changes in the way children behave, learn, or deal with their emotions which can lead to distress and various problems (Centers for Disease Control and Prevention, 2020c). Occasionally, children may have problems such as worries and fears or disruptive behaviors; however, if the symptoms are persistent, severe and interfere with the activities of children, they may be diagnosed with mental health disorders. These disorders can also disrupt the ability for children to function properly in terms of cognitive or social behaviors.

It has been estimated that between 13% and 20% of children in the United States experience a mental health problem every year and the costs to individuals, families and the society has been estimated to be approximately $247 billion (Centers for Disease Control and Prevention, 2020c). The most common mental disorders diagnosed in children are attention-deficit/hyperactivity disorder (ADHD), behavior disorders, anxiety and depression (Centers for Disease Control and Prevention, 2020c). Mental health disorders also account for the largest share of heath care expenditure for the health problems in children (Agency for Healthcare Research and Quality, 2015).

A review of the burden of mental health disorders concluded that mental health problems often begin at an early age in childhood, thus, early identification and interventions are critical (Kessler et al., 2009). Although it may be rare to diagnose mental health problems in younger children, research has shown that pre-school aged children have been included in treatment options because the diagnoses and treatment of such issues are complex (Ali et al., 2018).

Mental health problems persist for a long time, do not go way completely and can continue throughout lifetime into adulthood.

The prevalence and distribution of a wide range of mental health problems in children, which is important for prevention, treatment and resource allocation, has not been well studied (Ghandour et al., 2019). Thus, a more comprehensive assessment of mental health disorders in children is needed. Furthermore, various mental health issues have been assessed together rather than separately (World Health Organization, 2020). The social ecological model provides a conceptual framework to identify the factors associated with mental health problems such as individual, family factors and community or societal factors and their interaction with each other. The strong connection between parental characteristics and mental health problems in adolescents indicate the relevance of the family context within the development of mental health problems (Merikangas et al., 2010).

This study examines the prevalence estimates of mental disorders (ADHD, behavioral disorder, anxiety and depression) in a nationally representative sample of children, describes the individual, familial and community sociodemographic correlates of these mental disorders and explores the relationships between these correlates and mental health outcomes. This study contributes to the literature by providing current estimates of various mental disorders in children and covers a broader range of ages and across multiple levels of influence. These findings are important for better understanding the current extent of the mental health disorders among this population and informing the future program and advocacy efforts.

Methods

Study Design & Study Population

A cross-sectional study using secondary data from the 2018 National Survey of Children's Health (NSCH) was utilized. The NSCH is conducted by the United States Census Bureau, and the Maternal and Child Health Bureau of the Health Resources and Services Administration to assess the health and well-being of children.

The 2018 NSCH sample was compiled using 176,000 households from the Census Master Address File nationally. The sample was stratified at the state level and by a child-presence indicator, which allows for oversampling of households that were more likely to have children. A total of 30,530 surveys were completed with approximately 600 surveys per state and a response rate of 43.1% (Data Resource Center for Child and Adolescent Health, 2019). The survey design has been described in detail elsewhere (US Census Bureau, 2019).

The study population consisted of noninstitutionalized children between the ages of 3 and 17 nationally whose parents or guardians completed the survey. Children of caregivers who did not answer survey questions related to mental health outcomes were excluded.

Study Measures

The presence of current mental health conditions was assessed using survey parent/caregiver's responses to questions asking whether the doctor had ever told the parent/caregiver that the child had ADHD, anxiety, behavior disorders or depression (yes/no). If yes, a secondary question asked whether the child currently had the condition (yes/no). The

following response options in the dataset have been recommended to assess prevalence: “does not have the condition”, “ever told, but does not currently have the condition”, and “currently has the condition”. A dichotomous variable measuring whether the child currently has the condition was created and coded as (0) does not currently have condition; or (1) currently has condition. The outcome measures were limited to those children whose caretakers provided definite responses and current cases of the mental health outcomes of interest to reduce the limitation of establishing temporal precedence due to the cross-sectional design of the study.

Covariates

Demographic information such as child sex, age (3-5, 6-11, and 12-17 years), race/ethnicity, family structure (two married parents, two unmarried parents, single parent, nonparent/other relative), household educational level (less than high school/or high school diploma and some college or college degree/higher), insurance type (uninsured, private and public insurance, private insurance, and public insurance), and family poverty/income level (<100% FPL, 100-199% FPL, 200-399% FPL, and $\geq$ 400% FPL) were included in the study. The selection of these variables is consistent with other studies that examined ACEs or mental health outcomes (Elmore & Crouch, 2020; Ghandour et al., 2019). NSCH provides imputed values that were used for the analysis. Both household poverty level and household educational level were imputed using regression methods (US Census Bureau, 2020). Child sex, race/ethnicity were missing <1% observations and were imputed using hot-deck imputation.

Elmore, Crouch, & Kabir Chowdhury, (2020) noted that the mental health of caregivers could impact exposure to ACEs, resilience factors or mental health outcomes among children. As

such, the mental or emotional health of the parents or caregivers of the child were assessed and categorized as excellent, very good/good and fair/poor. Living and playing in safe and equitable environments have been shown to be examples of positive childhood experiences or resilient factors (Sege & Harper Browne, 2017). A response of yes or no to the survey questions, “In your neighborhood is there a park/playground” or “In your neighborhood is there a recreation center, community center, or boys’ and girls’ club ” were used as responses for the variable ‘opportunities for play and physical activity’. Living in a safe neighborhood was examined as two categories: agree and disagree.

Medical home initiatives have been identified as an important service for children with special needs (American Academy of Pediatrics & Medical Home Initiatives for Children With Special Needs Project Advisory Committee., 2002) and is included in this study. Essential qualities of a medical home has been defined as: accessible, continuous, coordinated, compassion, comprehensive, culturally effective and family-centered care (National Resource Center for Patient-Centered Medical Home, 2020). The medical home variable criteria as measured by the NSCH was based on five components which include having a personal doctor or nurse who knows the child’s health history well, usual source of care, family-centered care, receiving the necessary help to coordinate the child’s care and obtaining referrals for services. This is a widely used measure that reflects the description of medical home stated by the American Academy of Pediatrics and approved by the National Quality Forum (Child and Adolescent Health Measurement Initiative (CAHMI), 2009). A table is listed in the appendix with the names of all variables, original measurement and how they were recoded.

Statistical Analysis

The characteristics and demographics of the study population were described by each mental health outcome (ADHD, anxiety, behavior disorders and depression). Given the study variables are categorical, descriptive statistics were chi-square analysis used to examine the mental health outcomes relative to individual, parental, and community or societal contexts of interest. Survey weights provided by the Census Bureau were utilized to account for nonresponse and non-coverage and reflect the US population of all noninstitutionalized children aged 0-17 years. Logistic regressions were performed to obtain unadjusted and adjusted odd ratios to assess associations of mental health outcomes with sociodemographic characteristics. All analyses were conducted using SAS (Version 9.4. SAS Institute Inc., Cary, NC, USA).

Results

The children in this study population were nearly equally divided between males (51%) and females (49%; Table 2.1). Across the three age groups, there were 19%, 40% and 41% of children aged 3-5 years, 6-11 years, and 12-17 years respectively. The majority of the sample was non-Hispanic White (50%) while 14% were non-Hispanic Black and 26% were Hispanic. Over one-quarter (30%) of children had public insurance, 57% had private insurance only and 9% were uninsured. Most children lived with both parents who were married (61%) and had a caregiver respondent who had some college education or higher (70%). Approximately twenty percent of children lived below the federal poverty line and majority (88%) of the caregivers of the children reported excellent, very good or good health. Nearly half (48%) of study participants reported the receipt of care in a medical home. Approximately 92% of participants

reported living in a safe neighborhood and 77% reported having opportunities for physical activity or recreation within their community.

Prevalence estimates of mental health outcomes among children in the study population are shown in Table 2.1. Less than ten percent of children (9%) had current ADHD while 91% did not have current ADHD. Approximately 7% had current behavioral disorders while 93% did not have current behavioral disorders. The majority of children did not have current anxiety (92%) while the remaining (8%) had current anxiety. The vast majority of children did not have current depression (96%) while the remaining (4%) had current depression.

Significant differences ($p<0.05$) were found for the following characteristics for all mental health outcomes: sex, race, age, insurance status, family structure, income, caregiver mental health and medical home. Both ADHD and behavior disorders were most common for males (12%, 9% respectively) compared to females (6%, 5% respectively), while anxiety and depression were most common for females (9%, 4% respectively) compared to males (7%, 3% respectively). ADHD was most common for ages 12 to 17 (11%) than ages 3 to 5 (1%). Anxiety was most common for ages 12 to 17 (11%) than ages 3 to 5 (2%). Depression was most common for ages 12 to 17 (7%) than ages 3 to 5 (<1%). Behavior disorders was most common for ages 6-11 (9%) than ages 3 to 5 (4%). While ADHD and anxiety were most common for non-Hispanic white children (10%), non-Hispanic white and non-Hispanic black children were equally likely to have depression (4%) and among non-Hispanic black children, 10% reported having behavior disorders. Higher proportions of children with public and private insurance reported having ADHD (16%) than uninsured children (7%). Behavior disorders (15%) were more common among children with public and private insurance than uninsured children (7%). Children with public and private insurance had higher proportions of children reporting anxiety (14%) than

uninsured children (8%). Children with public and private insurance were most likely to report depression (9%) than uninsured children (3%).

ADHD and behavior disorders were most common for children living with relatives or non-parents (12%, 12% respectively) compared to children with both married parents (8%, 5% respectively), while anxiety and depression were most common for children living with single parents (10%, 6% respectively) compared to children with both married parents (7%, 3% respectively). Family poverty level was a significant correlate for behavior disorders and depression. Higher proportions of children with a family income below 100% Federal Poverty Level reported behavior disorders (9%) and depression (5%) compared to children with a family income above 400% Federal Poverty Level (5%, 3% respectively). Children with caregivers whose mental health was fair or poor were most likely to experience ADHD (23%), behavior disorders (25%) anxiety (29%) and depression (18%) compared to 8%, 6%, 7% and 3% respectively of children with caregivers who had excellent, very good or good health. Anxiety and depression were most common for children who did not live in safe neighborhoods (11%, 7% respectively) compared to children who lived in safe neighborhoods (8%, 3% respectively). ADHD, behavior disorders, anxiety and depression were most common for those who did not receive care in a medical home (10%, 8%, 10% and 5% respectively) compared to children who received care in a medical home (7%, 5%, 6% and 2% respectively).

Logistic Regression Results

Unadjusted odd ratios (OR) and adjusted odd ratios (aOR) of the associations between individual, familial and community sociodemographic characteristics for the four mental health outcomes are presented in Table 2.2. After adjustment, the strength of most these relationships was not attenuated. In the adjusted models, males compared to females had higher odds of

ADHD (aOR: 2.26; CI: 1.89-2.71) and behavior disorders (aOR: 1.87; CI: 1.51-2.30). Males compared to females had lesser odds of anxiety (aOR: 0.76; CI: 0.65-0.90) and depression (aOR: 0.70; CI: 0.54-0.91). Hispanic children had lower odds of ADHD (aOR: 0.56; CI: 0.41-0.76), behavior disorders (aOR: 0.68; CI: 0.50-0.92), and depression (aOR: 0.45; CI: 0.31-0.65) relative to White children. Blacks compared to Whites had lesser odds of anxiety (aOR: 0.36; CI: 0.26-0.50). Children aged 3-5 years had lesser odds of ADHD than children aged 12-17 years (aOR: 0.11; CI: 0.08-0.16) as well as lesser odds of anxiety (aOR: 0.16; CI: 0.11-0.22) and depression (aOR: 0.03; CI: 0.01-0.11). Children aged 6-11 years had higher odds of behavioral disorders than children aged 12-17 years (aOR: 1.63; CI: 1.33-1.99), but lesser odds of anxiety (aOR: 0.64; CI: 0.54-0.76) and depression (aOR: 0.27; CI: 0.20-0.38). Individuals with private insurance alone had lesser odds of ADHD (aOR: 0.70; CI: 0.53-0.93), behavioral disorders (aOR 0.47; CI: 0.37-0.61) and depression (aOR 0.52; CI: 0.39-0.69) compared to individuals with public insurance alone. Individuals with public and private insurance were more likely to have ADHD (aOR: 1.54; CI: 1.11-2.12), behavioral disorders (aOR: 1.40; CI: 1.01-1.95), anxiety (aOR: 1.62; CI: 1.13-2.30), and depression (aOR: 1.80; CI: 1.09-2.98) compared to individuals with public insurance alone. Individuals without insurance had lesser odds of ADHD (aOR: 0.58; CI: 0.40-0.86), behavioral disorders (aOR 0.65; CI: 0.43-0.99), and depression (aOR 0.47; CI: 0.26-0.83) compared to individuals with public insurance alone.

In the adjusted models, children living with single parents compared to children living with both married parents remained strongly associated with and related to increased odds of behavior disorders (aOR: 1.60; CI: 1.27-2.02), anxiety (aOR: 1.21; CI: 0.97-1.51) and depression (aOR: 1.38; CI: 1.01-1.90). Children living with non-parents or relatives compared to children living with both parents had higher odds of being diagnosed with ADHD (aOR: 4.03; CI: 2.41-

6.75), behavior disorders (aOR: 4.84; CI: 2.67-8.75) and anxiety (aOR: 2.21; CI: 0.50-9.81). Children whose caregivers' mental health was excellent, very good or good had lesser odds of ADHD (aOR: 0.31; CI: 0.21-0.45), behavior disorders (aOR: 0.26; CI: 0.17-0.39), anxiety (aOR: 0.22; CI: 0.15-0.33) and depression (aOR: 0.23; CI: 0.14-0.36) compared to children whose caregivers' mental health was fair or poor. Children whose caregivers had high school education had lesser odds of behavioral disorders (aOR: 0.74; CI: 0.58-0.94) and anxiety (aOR: 0.66; CI: 0.52-0.83) compared to children whose caregivers had some college education.

In the adjusted models, children not receiving care in a medical home had higher odds of behavioral disorders (aOR: 1.34; CI: 1.08-1.66), anxiety (aOR: 1.54; CI: 1.32-1.81), and depression (aOR: 1.45; CI: 1.10-1.91) compared to children who received care in a medical home.

Discussion

The findings from this study reveal that 9% of children had ADHD, 7% had behavior disorders, 8% had anxiety and 4% had depression. According to the CDC, in 2016, 8.4% of children in the U.S were currently diagnosed with ADHD, 7.4% were diagnosed with behavioral disorders, 7.1% were diagnosed with anxiety and 3.2% were diagnosed with depression (Centers for Disease Control and Prevention, 2020c). The prevalence estimates for each mental health disorder in this study were slightly higher (except for that of behavioral disorders) than those reported by the CDC, although comparable, as well as higher than estimates from other surveys reported previously (Centers for Disease Control and Prevention, 2013; Visser, Deubler, et al., 2016). Estimates from the 2007 National Health Interview Survey data (survey was conducted in-person) and the 2012 NSCH survey data (survey was conducted via phone) were only half of those reported here for anxiety and behavioral disorders, although the estimates for depression

were similar to the redesigned NSCH data utilized in this study. The differences in the mode of data collection, wording of questionnaires, and changes in diagnoses criteria may explain certain differences. These estimates present an important baseline from which to assess future annual NSCH data to determine trends and patterns overtime for these indicators of mental health disorders by demographic subgroups and overall.

Our study noted that estimates for ADHD, behavior disorders, anxiety and depression among younger children aged 3-5 years were 1.4%, 4.3%, 2.1% and 0.3% respectively. Past estimates for behavior disorders, anxiety and depression among children aged 3-5 years were 3.4%, 1.3% and 0.08%, respectively (Ghandour et al., 2019) . These results suggest an early onset of these disorders in young children. This is comparable to a study of insurance claims data which showed an increase in the number of children aged 2–5 years that received clinical care for mental health disorders from 2008 to 2014 (Visser, Danielson, et al., 2016) as well as a study of electronic health record data showing increased pediatric visits associated with mental health care for children aged 4-5 years from 2008 to 2014 (Fiks et al., 2016). Our findings, coupled with other research that has noted increases in the prevalence of younger children experiencing mental health outcomes over time children (Danielson et al., 2017); (Danielson et al., 2018) underscores the importance of improving access to care and diagnoses of these conditions in younger.

There were racial/ethnic differences among the four mental health disorders with non-Hispanic White children having the highest percentage of children having mental health disorders except for behavioral disorders which was more prevalent among Black children. Although it might be possible that this difference is due to changes in the methodology section of the NSCH, these results suggest that reconsidering prior documented concerns regarding the

under diagnosis of ADHD or other mental disorders in Black children may be appropriate (Coker et al., 2016; Morgan et al., 2013). Limited access to care more broadly among Black and Hispanic children may imply that these children are less likely to use health services and thus be examined by providers or diagnosed with these conditions (Wang et al., 2013). However, racial disparities in diagnosis such as bias linked to conduct problems were attributed to the disproportionately high rates of behavioral disorders among Black and Hispanic children (Mizock & Harkins, 2011). This underscores the importance of assessing factors that contribute to health disparities in terms of access, engagement and utilization of mental health services as well as providing solutions and promising practices to reduce these disparities.

Research has shown certain factors that contribute to the disparities in access and utilization of mental health services for racial minorities compared to their Caucasian counterparts. Children who need mental health care depend on their caregivers to seek care, thus the attitudes of their caregivers or parents are critical determinants of whether children use mental health services.

Stigma among racial minorities may decrease the utilization of mental health services. According to a research study, Blacks have beliefs associated with stigma which impacts how they seek mental health services (Ward et al., 2013). Accessibility barriers such as the lack of transport, perceptions about the effectiveness of treatment and inconvenient location of providers have also been cited (Alang, 2019). Furthermore, it has been shown that access to treatment depends on race, income, insurance and geography rather than individual preferences or medical indicators (Williams & Wyatt, 2015). According to a study that examined racial differences in the utilization of children's mental health services, Hispanic parents consistently reported stigma and socioeconomic barriers as more inhibiting compared to African American parents.

Specifically, Hispanic parents reported health insurance barriers, distance to the clinic, stigma and long wait times as more likely to hinder than from seeking services for their children compared to African American and Caucasian parents (Young & Rabiner, 2015). Also, there is a shortage of Hispanic and Black mental health providers, which can result in a lack of culturally responsive care, hence making it difficult for minority populations to engage in treatment. Regardless of income, areas with high proportions of Hispanic and Black residents are 4 times as likely as areas with White residents to have a lack of providers (American Journal of Managed Care, 2004).

Past studies on the receipt of treatment by a mental health professional among children showed that the receipt of mental treatment was highest among children diagnosed with depression (78%), whereas that of ADHD, behavioral problems, anxiety and behavior disorders was 60%, 59% and 54% respectively (Ghandour et al., 2019). The results from this study showed the need for increased use of a medical care home, particularly for children with depression having the highest receipt of treatment by a mental health professional. Children in this study that received care in a medical home were less likely to have any of the four mental health disorders. There has been an emphasis on the use of the medical home models of care in order to address the social determinants of health and mental health (Ghandour et al., 2011). The findings demonstrate the need for research on best ways to optimize the efficacy of the medical home to address mental health.

The differences in the receipt of treatment between these disorders have been described where behavioral problems and anxiety are sometimes treated in primary care or educational settings with a focus on behavioral management techniques and parental behaviors rather than direct treatment provided to the child (Cheung et al., 2013). These differences as well as the

severity of the disorder, comorbidity of disorders, and income of the household could also predict the receipt of mental health treatment, highlighting the complexity of provision of mental health treatment and utilization of mental health services by children with mental health disorders.

The results from this study revealed that children living in households with higher income levels were less likely to have behavioral disorders and depression compared to children living below the federal poverty level, although this was not significant after adjustment. However, prior research has noted that children from poor families were less likely to be diagnosed or treated (Hodgkinson et al., 2017). Furthermore, examining the insurance status, uninsured and privately insured children were less likely to have all four mental health outcomes compared to children with public insurance alone, while children with public and private insurance were more likely to have mental health disorders compared to children with public insurance alone. These findings are comparable to a different study which showed that children with public insurance (either combined with private coverage or used alone) were more likely to have these disorders compared to privately insured children (Merikangas et al., 2010). The results from this study suggest having access to a provider who is capable of diagnosing these mental health disorders and poor children are unable to have such access, thus making them less likely to obtain mental health treatment.

Busch and Horwitz (2004) showed that children without insurance had extremely decreased access to mental health services compared to children with insurance. A different study found that a higher number of children with public insurance used mental health services compared to privately insured and uninsured children (Kataoka et al., 2002). They also found that children in foster care have a much higher rate of obtaining the necessary services, which is

attributed to access to services that are reimbursed by Medicaid as well as having a foster family and caseworker that ensure use of mental health services. Detecting these types of differences and trends by type of insurance over time could be used to examine differences in the frequency of diagnoses for subpopulations as well as to recognize any changes within the underlying population of children diagnosed with these mental health disorders.

The lack of insurance also contributes to disparities in the utilization of health services by Black and Hispanic individuals. In 2018, the number of uninsured Hispanics and Blacks were 19% and 11.5% respectively to 7.5% of Whites (Kaiser Family Foundation, 2020). Decreasing the number of uninsured individuals could possibly eliminate some of the cost barriers associated with mental health care. Increasing the number of mental health facilities that offer sliding fees or accept public insurance could improve the affordability of mental health services. Since insurance most times provide less coverage for mental health services, improving coverage could enhance affordability.

Regarding family structure, children living in single-parent homes or living with other relatives were more likely to have mental health disorders compared to children living with both parents who were married in this study. Children who lived in households with less than two parents have been shown to have an increased likelihood of accessing mental health services (Burnett-Zeigler & Lyons, 2010). Another study also showed an increased rate of mental health treatment for adolescents with divorced parents compared to adolescents with cohabitating or married parents (Merikangas et al., 2011), as well as higher rates of unmet need for children whose parents were divorced compared to children with two parents (Miller et al., 2013).

Limitations

This study is subject to certain limitations. The sampling and administration of the NSCH survey was significantly changed in 2016 (US Census Bureau, 2019). Due these changes, data from the same survey in prior years may not be compared directly statistically. However, the estimates from this study for ADHD was consistent with prior administrations of the NSCH and published estimates from the National Health Interview Survey (Bloom B & Simpson JL, 2016; Bloom Barbara et al., 2013; Visser et al., 2014).

The cross-sectional nature of the study limits our ability to form causal inferences although the outcome measures were restricted to current mental disorders to decrease the bias of temporality. Also, the analysis is subject to individuals who participated in the study and overall weighted response rate for the survey was 43.1%., which may have led to non-response bias; however, nonresponse bias analyses show that the application of sample weights to these analyses were meant to attenuate resulting bias (U.S Census Bureau, 2019). Data collected in this survey was based on parent/caregiver report of the child's diagnosis and may be subject to recall bias. However, research has shown convergent validity of estimated prevalence from clinical records and parental reports and high reliability for maternal reports of mental health diagnoses in children, which suggests that parental reports may be less problematic (Kentgen et al., 1997; Visser et al., 2013).

Conclusions

Despite these limitations, this study provides updated estimates of the prevalence of multiple diagnosed mental health disorders (ADHD, behavioral disorders, anxiety and depression) among children and adolescents in the US as well as document the fact that a

substantial proportion of children in the US suffer from these disorders that can result in severe impairment, which justifies the need for continuous monitoring of these outcomes in this population. Considered with recent findings showing that the yearly economic burden of mental health problems on the well-being of children and their families approximates a quarter of one trillion dollars (Centers for Disease Control and Prevention, 2020c), these results emphasize the public health importance of mental health in children. These data can guide and inform the generation of priorities for further research and health policy through the provision of previously limited prevalence estimates in a nationally representative sample of children in the U.S as well as the individual, family and community characteristics related to mental health disorders.

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Table 2.1

Characteristics of Study Population in Total and by Current Mental Health Status Among Respondents to the 2018 NSCH

Characteristic		Current ADHD		Current Behavior Disorder		Current Anxiety		Current Depression	
	Total	Yes	No	Yes	No	Yes	No	Yes	No
	N [a](%)[b]	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Total Sample	26572	2677 (8.6)	23895 (91.4)	1901 (6.9)	24671 (93.1)	2719 (8.0)	23853 (92.0)	1198 (3.7)	25374 (96.3)
Individual Level									
Sex		***		***		**		*	
Male	13892 (51.1)	1845 (11.5)	12047 (88.5)	1340 (8.7)	12552 (91.3)	1277 (7.1)	12615 (92.9)	531 (3.1)	13361 (96.9)
Female	12680 (48.9)	832 (5.6)	11848 (94.4)	561 (5.0)	12119 (95.0)	1442 (9.0)	11238 (91.0)	667 (4.3)	12013 (95.7)
Race/Ethnicity		***		**		***		^	
Hispanic	3129 (25.6)	248 (6.4)	2881 (93.6)	221 (5.8)	2908 (94.2)	267 (5.9)	2862 (94.1)	121 (2.6)	3008 (97.4)
White, Non- Hispanic	18388 (49.9)	1981 (10.0)	16407 (90.0)	1281 (6.9)	17107 (93.1)	2086 (10.3)	16302(89.7)	884 (4.2)	17504 (95.8)
Black, Hispanic	1739 (13.8)	193 (9.7)	1546 (90.3)	175 (9.7)	1564 (90.3)	122 (5.6)	1617 (94.4)	80 (4.2)	1659 (95.8)
Other, Non-Hispanic	3316 (10.6)	255 (6.2)	3061 (93.8)	224 (5.7)	3092 (94.3)	244 (5.7)	3072 (94.3)	113 (3.1)	3203 (96.9)
Age		***		***		***		***	
3-5 years	4618 (19.3)	65 (1.4)	4553 (98.6)	205 (4.3)	4413 (95.7)	92 (2.1)	4526 (97.9)	8 (0.3)	4610 (99.7)
6-11 years	9367 (40.2)	1024 (9.8)	8343 (90.2)	863 (9.2)	8504 (90.8)	850 (7.6)	8517 (92.4)	187 (2.1)	9180 (97.9)
12-17 years	12587 (40.5)	1588 (10.9)	10999 (89.1)	833 (5.9)	11754 (94.1)	1777 (11.3)	10810 (88.7)	1003 (6.9)	11584 (93.1)
Insurance Status		***		***		*		***	
Public only	5333 (30.1)	754 (10.2)	4579 (89.8)	729 (10.5)	4604 (89.5)	714 (8.4)	4619 (91.6)	379 (5.1)	4954 (94.9)
Private only	18629 (57.1)	1577 (7.6)	17052 (92.4)	880 (4.5)	17749 (95.5)	1679 (7.5)	19650 (92.5)	661 (2.7)	17968 (97.3)
Public and private	1005 (3.9)	214 (15.8)	791 (84.2)	192 (14.5)	813 (85.5)	197 (13.8)	808 (86.2)	97 (8.8)	908 (91.2)
Uninsured	1605 (8.9)	132 (6.6)	1473 (93.4)	100 (6.5)	1505 (93.5)	129 (8.0)	1476 (92.0)	61 (2.8)	1544 (97.2)
Family Level									
Family Structure		***		***		^		***	
Non-Parent/ Other Relative	1594 (8.4)	263 (12.3)	1331 (87.7)	241 (11.9)	1353 (88.1)	205 (8.6)	1389 (91.4)	113 (5.1)	1481 (94.9)
Single Parent	5268 (22.8)	657 (10.1)	4611 (89.9)	545 (10.0)	4723 (90.0)	690 (9.8)	4578 (90.2)	349 (5.6)	4919 (94.4)
Two Parents Unmarried	1666(8.0)	178 (9.1)	1488 (91.0)	151 (8.2)	1515 (91.8)	174 (8.1)	1492 (91.9)	87 (4.3)	1579 (95.7)
Two Parents Married	18044 (60.7)	1579 (7.5)	16465 (92.5)	964 (4.8)	17080 (95.2)	1650 (7.3)	16394 (92.7)	649 (2.7)	17395 (97.3)
Household Educational Level						^			
< High school/ High school	4405 (29.8)	416 (7.5)	3989 (92.5)	416 (7.5)	3989 (92.5)	452 (6.8)	3953 (93.2)	236 (4.4)	4169 (95.6)
Some college or more	22167(70.2)	1485 (6.6)	20682 (93.4)	1485 (6.6)	20682 (93.4)	2267 (8.5)	19900 (91.5)	962 (3.4)	21205 (96.6)

Income/Poverty Level				***				*	
<100% FPL;	3156 (19.7)	366 (9.4)	2790 (90.6)	366 (9.4)	2790 (90.6)	379 (8.3)	2777 (91.7)	208 (5.1)	2948 (94.9)
100-199% FPL;	4366 (22.1)	423 (8.0)	3943 (92.0)	423 (8.0)	3943 (92.0)	495 (7.6)	3871 (92.4)	247 (4.2)	4119 (95.8)
200-399% FPL;	8129 (27.1)	534 (6.5)	7595 (93.5)	534 (6.5)	7595 (93.5)	807 (8.3)	7322 (91.7)	335 (2.8)	7794 (97.2)
≥ 400% FPL	10921 (31.1)	578 (4.8)	10343 (95.2)	578 (4.8)	10343 (95.2)	1038 (7.9)	9883 (92.1)	408 (3.2)	10513 (96.8)
Caregiver Mental Health		***		***		***		***	
Excellent, very good/good	24260 (88.3)	2280 (7.9)	21980 (92.1)	1519 (5.9)	22741 (94.1)	2332 (7.4)	21928 (92.6)	974 (3.0)	23286 (97.0)
Fair/poor	672 (2.9)	151 (23.2)	521 (76.8)	163 (25.1)	509 (74.9)	205 (28.8)	467 (71.2)	122 (18.3)	550 (81.7)
No response	1640 (8.8)	246 (11.1)	1394 (88.9)	219 (10.7)	1421 (89.3)	182 (7.9)	1458 (92.1)	102 (5.1)	1538 (94.9)
Community/Societal									
Opportunities for play/activity									
Yes	19965 (77.2)	1944 (8.5)	18021 (91.5)	1408 (6.8)	18557 (93.2)	2038 (7.9)	17927 (92.1)	869 (3.7)	19096 (96.3)
No	6607 (22.8)	733 (9.1)	5874 (90.9)	493 (7.1)	6114 (92.9)	681 (8.4)	5926 (91.6)	329 (3.7)	6278 (96.3)
Safe Neighborhood						^		*	
Agree	25207 (92.4)	2495 (8.5)	22712 (91.5)	1746 (6.7)	23461 (93.3)	2518 (7.8)	22689 (92.2)	1111 (3.4)	24096 (96.6)
Disagree	1365 (7.6)	182 (10.0)	1183 (90.0)	155 (9.0)	1210 (91.0)	201 (10.8)	1164 (89.2)	87 (6.5)	1278 (93.5)
Medical Home		*		***		***		***	
Yes	14165 (47.8)	1284 (7.6)	12881 (92.4)	736 (5.3)	13429 (94.7)	1192 (6.4)	12973 (93.6)	437 (2.3)	13728 (97.3)
No	12407 (52.2)	1393 (9.5)	11014 (90.5)	1165 (8.3)	11242 (91.7)	1527 (9.5)	10880 (90.5)	761 (4.6)	11646 (95.4)

^p≤ .05 *p ≤ .01 **p ≤ .001 ***p ≤ .0001 [a] Unweighted frequencies [b] Weighted percent

Table 2.2

Unadjusted and Adjusted Odds Ratios and 95% Wald Confidence Intervals for Current Mental Health Outcomes by Sociodemographic Among Respondents to the 2018 NSCH

Characteristic	Current ADHD		Current Behavior Disorder		Current Anxiety		Current Depression	
	OR (95% CI)	aOR (95% CI)†	OR (95% CI)	aOR (95% CI)†	OR (95% CI)	aOR (95% CI)†	OR (95% CI)	aOR (95% CI)†
Individual Level								
Sex								
Female	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Male	2.19 (1.84-2.61)***	2.26 (1.89-2.71)***	1.82 (1.48-2.23) ***	1.87(1.51-2.30) ***	0.77 (0.66-0.90) *	0.76 (0.65-0.90) **	0.72 (0.56-0.92) *	0.70 (0.54-0.91) **
Race/Ethnicity								
White, Non- Hispanic	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Black, Non- Hispanic	0.97 (0.75-1.25)	0.76 (0.56-1.03)	1.44 (1.11-1.87) *	0.90 (0.67-1.20)	0.51 (0.38-0.69) ***	0.36 (0.26-0.50) ***	0.99 (0.67-1.47)	0.55 (0.34-0.91) ^
Hispanic	0.62 (0.46-0.82) **	0.56 (0.41-0.76) **	0.83 (0.62-1.09)	0.68 (0.50-0.92) *	0.55 (0.42-0.72) ***	0.50 (0.38-0.66) ***	0.60 (0.41-0.87) *	0.45 (0.31-0.65) ***
Other, Non-Hispanic	0.60 (0.48-0.76) ***	0.56 (0.44-0.71) ***	0.82 (0.63-1.05)	0.69 (0.52-0.90) *	0.52 (0.40-0.68) ***	0.45 (0.34-0.60) ***	0.74 (0.47-1.16)	0.59 (0.36-0.99) ^
Age								
12-17 years	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
6-11 years	0.89 (0.75-1.05)	0.88 (0.74-1.04)	1.62 (1.34-1.96) ***	1.63 (1.33-1.99) ***	0.65 (0.54-0.77) ***	0.64 (0.54-0.76) ***	0.28 (0.21-0.39) ***	0.27 (0.20-0.38) ***
3-5 years	0.11 (0.08-0.17) ***	0.11 (0.08-0.16) ***	0.71 (0.54-0.95) ^	0.73 (0.54-0.98) ^	0.16 (0.12-0.23) ***	0.16 (0.11-0.23) ***	0.03 (0.01-0.11) ***	0.03 (0.01-0.11) ***
Insurance Status								
Public only	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Private only	0.72 (0.60-0.87) **	0.70 (0.53-0.93) ^	0.40 (0.33-0.49) ***	0.47 (0.37-0.61) ***	0.88 (0.74-1.05)	0.72 (0.57-0.92) *	0.52 (0.40-0.67) ***	0.52 (0.39-0.69) ***
Public and private	1.64 (1.20-2.24) *	1.54 (1.11-2.12) *	1.45(1.05-2.0) ^	1.40 (1.01-1.95) ^	1.75 (1.24-2.47) *	1.62 (1.13-2.30) *	1.79 (1.11-2.89) ^	1.80 (1.09-2.98) ^
Uninsured	0.62 (0.42-0.91) ^	0.58 (0.40-0.86) *	0.61 (0.40-0.90) ^	0.65 (0.43-0.99) ^	0.95 (0.62-1.46)	0.84 (0.54-1.31)	0.55 (0.31-0.98) ^	0.47 (0.26-0.83) *
Family Level								
Family Structure								
Two Parents Married	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Two Parents Unmarried	1.24 (0.86-1.78)	1.11 (0.76-1.63)	1.75 (1.21-2.53) *	1.33 (0.90-1.96)	1.12 (0.79-1.58)	1.10 (0.76-1.59)	1.65 (1.02-2.67) ^	1.33 (0.81-2.18)
Single Parent	1.40 (1.16-1.69) **	1.17 (0.94-1.46)	2.19 (1.77-2.71) ***	1.60 (1.27-2.02) ***	1.38 (1.15-1.66) **	1.21 (0.97-1.51) **	2.17 (1.64-2.87) ***	1.38 (1.01-1.90) ^
Non-Parent/ Other Relative	1.73 (1.34-2.23) ***	4.03 (2.41-6.75)***	2.67 (2.04 -3.49) ***	4.84 (2.67-8.75)***	1.19 (0.89-1.59)	2.21 (0.50-9.81)*	1.98 (1.36-2.88)**	1.06 (0.09-12.97)
Household Educational Level								
Some college or more	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
< High school/ High school	1.10 (0.90-1.35)	1.00 (0.77-1.29)	1.13 (0.92-1.39)	0.74 (0.58-0.94) ^	0.79 (0.64-0.97) ^	0.66 (0.52-0.83) **	1.31 (0.99-1.74)	0.92 (0.64-1.31)

Income/Poverty Level								
<100% FPL;	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
100-199% FPL;	0.93 (0.70-1.22)	1.04 (0.79-1.39)	0.83 (0.64-1.08)	1.02 (0.77-1.33)	0.90 (0.68-1.19)	0.97 (0.73-1.29)	0.81 (0.56-1.17)	1.02 (0.70-1.48)
200-399% FPL;	0.86 (0.68-1.10)	1.16 (0.86-1.54)	0.67 (0.51-0.88) *	1.15 (0.84-1.56)	1.00 (0.76-1.31)	1.10 (0.81-1.52)	0.53 (0.38-0.76) **	0.87 (0.62-1.23)
≥ 400% FPL	0.86 (0.68-1.07)	1.20 (0.90-1.60)	0.48 (0.38-0.62) ***	1.00 (0.74-1.36)	0.94 (0.73-1.21)	1.08 (0.80-1.45)	0.62 (0.44-0.88) *	1.18 (0.80-1.74)
Caregiver Mental Health								
Fair/poor	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Excellent, very good/good	0.28 (0.20-0.40) ***	0.31 (0.21-0.45) ***	0.19 (0.13-0.26) ***	0.26 (0.17-0.39) ***	0.19 (0.12-0.33) ***	0.22 (0.15-0.33) ***	0.14 (0.09-0.21) ***	0.23 (0.14-0.36) ***
Community/Societal Opportunities for play/activity								
Yes	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
No	1.07 (0.90-1.28)	0.98 (0.81-1.18)	1.05 (0.86-1.29)	0.92 (0.73-1.15)	1.07 (0.88-1.31)	0.95 (0.78-1.16)	1.00 (0.76-1.31)	0.85 (0.65-1.12)
Safe Neighborhood								
Agree	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Disagree	1.19 (0.89-1.59)	0.99 (0.71-1.37)	1.37 (0.98-1.94)	0.90 (0.60-1.37) ^	1.43 (1.05-1.95) ^	1.25 (0.90-1.76)	1.95 (1.27-3.00) *	1.28 (0.82-2.00)
Medical Home								
Yes	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
No	1.27 (1.08-1.50) *	1.18 (0.99-1.42)	1.60 (1.32-1.93) ***	1.34 (1.08-1.66) *	1.52 (1.30-1.78) ***	1.54 (1.32-1.81)***	1.72 (1.33-2.23) ***	1.45 (1.10-1.91) *

†Adjusted for all variables ^p≤ .05 *p ≤ .01 **p ≤ .001 ***p ≤ .0001

Chapter 3. Adverse Childhood Experiences (ACEs), Resilience and Mental Health Outcomes Among Children

Abstract

Introduction: This study examines the association between ACEs, resilience and mental health outcomes (ADHD, behavioral disorder, anxiety and depression) among children and adolescents ages 3 to 17 years old.

Methods: Using data from the 2018 NSCH, a cross sectional study design was conducted. Exposure variables included resilience factors grouped into 3 categories as individual, family and community factors as well as 9 ACE exposures. Outcome variables included mental health outcomes. Chi-square analysis and logistic regression were conducted using survey procedures and sampling weights to obtain nationally representative results.

Results: Children exposed to 4 or more ACEs had greater odds of ADHD (adjusted odds ratio [aOR]= 2.03; 95% confidence interval [CI], 1.52-2.72), behavioral disorders (aOR: 2.47; CI: 1.81-3.37), anxiety (aOR: 2.66; CI: 2.00-3.53) and depression (aOR: 4.53; CI: 3.13-6.54). Analysis showed that all resilience measures were associated with significantly lower odds of all mental health outcomes with individual resilience having the least odds of ADHD (aOR: 0.19; CI: 0.15-0.22), behavioral disorders (aOR: 0.11; CI: 0.09-0.14), anxiety (aOR: 0.21; CI: 0.17-0.26) and depression (aOR: 0.20; CI: 0.13-0.29).

Conclusion: Exposure to ACEs was common among children and those with current mental health outcomes were more likely to be exposed to ACEs compared to those without these disorders. The results suggest that resilience may decrease the burden of mental illness, even if the illness is not completely eradicated. Developing the personal attributes of children related to

resilience and fostering familial and community resilience factors could help to decrease the impact of mental illness.

Keywords: adverse childhood experiences, resilience, association, mental health

Introduction

A growing body of research has indicated that the negative experiences during childhood across different contexts can create problems that continue into adulthood. Adverse childhood experiences (ACEs) include various types of trauma such as physical, psychological or sexual abuse, violence within the home, living with a mentally ill person or someone who has been imprisoned or living in poverty (Felitti et al., 1998). These experiences can occur in various combinations during childhood and the cumulative experience of various types of trauma has been shown to have greater negative implications (Blum et al., 2019; Chang et al., 2019). ACEs also have been shown to have a strong cumulative effect on mental health in adults and significantly increase the use of mental health care (van Duin et al., 2019). The higher risk associated with the cumulative exposure to ACEs during childhood and adolescence indicates that the wellbeing and development of children exposed to ACEs needs to be studied.

The strongest associations between adult health outcomes and ACEs have been seen in mental health. A population-based study was conducted examining the comorbidity of mental, physical and developmental conditions associated with ACEs and found that an increased score was associated with having at least one of the three health conditions, with the strongest association being mental conditions (Bright et al., 2016).

ACEs affect children at different ages. Mental health problems, chronic medical problems and social problems are seen even in young children. A study of children in the child welfare system aged 18 to 71 months showed that for every additional ACEs, there was 33% increased odds of a mental health or behavioral health problem, 21% increased odds of a chronic

medical condition and 78% increased odds of a social problem (Kerker et al., 2015). In a different study conducted among 6 to 17 years, they found that as the total ACE score increased, the physical and emotional health of children declined (Balistreri, 2015). Even though a large portion of research has been conducted in adults with retrospective reporting of ACEs, understanding the biological pathway between mental health problems and early trauma requires studying the immediate consequences of ACEs. Research on mental health outcomes in children related to ACEs is sparse.

Research has shown that about 50% of all children within the US have experienced at least one ACE (C. D. Bethell et al., 2014). Another study utilized the 2012 NSCH data and found that 75% of children between the ages of 6 and 17 years that have been diagnosed with mental, emotional or behavioral problems have experienced at least one ACE and research is needed to explore how ACEs affect the behavioral outcomes of children and adolescents (C. Bethell et al., 2016). Prior studies using the NSCH have described the reports from parents regarding ACEs experienced by their children (Caballero et al., 2017; Jimenez et al., 2016). However, few studies provided a wider assessment of child and family characteristics that can affect exposure to ACEs. Also, few studies have examined whether exposure to ACEs differentially affects anxiety and depression or internalizing and externalizing disorders separately (Elmore & Crouch, 2020).

Even though the consequences of ACEs may appear discouraging, there are protective factors that help to mitigate the effects of ACEs and improve resiliency. Conditions of chronic stress become accumulated when resilient factors are absent which can negatively impact the development in children and ultimately their life trajectories (Center on the Developing Child at

Harvard University, 2016). Resilience enables a favorable pattern of adaptation whenever adversity is present. In spite of extreme stressors, resilient individuals are capable of recovering and functioning well. Within the context of a socio-ecological model, resilience may occur at the individual, family and community factors. Future studies on resilient factors are necessary to understand and address these adverse events (Gartland et al., 2019; Howell & Miller-Graff, 2014).

This paper focuses on the relationship between ACEs, resilience and select mental health problems (attention-deficit hyperactivity disorder (ADHD), behavioral disorder, anxiety and depression). Estimating the prevalence, characteristics and impact of ACEs and resilience on common mental health outcomes for younger populations is imperative in identifying interventions for vulnerable populations.

Methods

Study Design & Study Population

This study used a cross-sectional design with secondary data from the 2018 National Survey of Children's Health (NSCH). This survey is designed to provide information on the health and well-being of children, their families and communities over several domains. These domains include access to and use of health care, special health care needs, parental health, family interactions, school experiences and neighborhood characteristics.

Data for the 2018 NSCH was conducted via mail, internet or phone from June 2018 through January 2019 by the United States Census Bureau, and the Maternal and Child Health

Bureau of the Health Resources and Services Administration. A total of 71,000 screener questionnaires were completed nationally by parents or caregivers of non-institutionalized children who knew about the children' health. There were 30,530 surveys completed nationally with approximately 600 surveys collected per state. The weighted overall response rate for the survey was 43.1% (Data Resource Center for Child and Adolescent Health, 2019).

The study population consisted of noninstitutionalized children between the ages of 3 and 17 in the U.S whose parents or guardians completed the survey. Children of caregivers that did not answer survey questions related to mental health outcomes, exposure to ACEs and resilience factors were excluded.

Outcome Variables

Four mental health outcomes are of primary interest in this study: ADHD, anxiety, behavior disorders and depression. To assess various health conditions among children, the NSCH inquires about 27 health conditions including ADHD, anxiety, behavior disorders and depression though the survey question: "Has a doctor or other health care provider ever told you that this child has…". If yes is answered, a follow-up question "Does this child currently have this condition?" is answered (yes/no). A dichotomous variable measuring whether the child currently has the condition was created and coded as (0) does not currently have condition; or (1) currently has condition. The outcome measures were limited to children whose parents or guardians provided definite responses and current cases to decrease the temporal limitations of the cross-sectional design of the study.

Independent Variables (ACEs & Resilience)

Measures of ACEs and resilience are the primary independent variables. In this dataset, nine ACE exposures measured by the NSCH include: socio-economic hardship, parental separation or divorce, parental death, parental incarceration, witnessing household violence, witnessing neighborhood violence, household mental illness, household substance abuse, and racial/ethnic discrimination. ACEs studies often include other indicators such as physical abuse, sexual abuse or neglect. The NSCH did not include questions about these events to decrease underreporting due to social desirability bias (C. D. Bethell et al., 2017). The nine ACE survey questions are outlined in the appendix.

All ACE measures were coded as yes/no except for economic hardship, which was recoded into two categories: somewhat often or very often and never or rarely. An aggregate ACE score for each respondent was calculated as the sum of "yes" responses. This approach is consistent with other studies (Balistreri, 2015; Blum et al., 2019; Chang et al., 2019). A categorical measure of ACE count was constructed representing children with <4 ACEs and ≥4 ACEs. This cut-off point has been shown to be a valid threshold using various ACE screening tools and the NSCH where individuals who had four or more ACEs had a higher probability of negative health outcomes (Elmore et al., 2020; Elmore & Crouch, 2020; Felitti et al., 1998; Kerker et al., 2015; McKelvey et al., 2016).

The socio-ecological model was used to categorize resilient factors at the individual, family and community levels. Thus, variables were constructed to demonstrate aspects of individual, family and community levels of resilience. A three-item index that indicates

resilience at the individual level has been established and an index score is present in the data set. A technical expert panel based upon a review of positive health indicators developed the set of questions. Questions measuring children's interest and curiosity in learning new things, persistence in completing tasks, and capacity to regulate emotions were used to measure resilience at the individual level. Answers of "usually" or "always" were assigned 1 point and used to indicate that the child exhibited the particular positive indicator while answers of "sometimes" or "never" were assigned 0 point and used to indicate that the child does not exhibit that indicator. Categories in this index were definitely true responses to 0-1 items, 2 items or 3 items. Children were grouped according to whether they demonstrated 0–1, 2, or all 3 flourishing items. These were recoded into two categories as high resilience (all 3 items) versus low resilience (less than 3 items). Since this index was appropriate for children aged 6-17 years, another category or response included within this index were children aged 0-5 years.

For children below 6 years, four questions capture resilience at the individual level. The survey questions asked, "How often: (1) is this child tender and affectionate (2) does this child bounce back quickly when things do not go his/her way, (3) does this child show interest or curiosity in learning , and (4) does this child smile and laugh?". Children were grouped according to whether they demonstrated 0–2, 3, or all 4 flourishing items. These were recoded into two categories as high resilience (all 4 items) versus low resilience (less than 4 items). Children with a score of three for ages 6-17 years or four for ages 6 months-5 years are usually classified as flourishing (C. D. Bethell et al., 2019).

A four-item family resilience index (FRI) was used to measure resilience at the family level which is an established index within the dataset (C. D. Bethell et al., 2019). The index

asked parents, “When your family faces problems, how often are you likely to”: “talk together about what to do,” “work together to solve our problems,” “know we have strengths to draw on,” and “stay hopeful even in difficult times”. One point was assigned for each time a parent respondent answered “all of the time” or “most of the time” to one of the four FRI items and used to indicate that the presence of the indicator. Answers of “some of the time” or “none of the time” were assigned 0 point and used to indicate the absence of that indicator. The family resilience index score was grouped as ‘all or most of the time to 0-1 item’, ‘all or most of the time to 2-3 items’ and "all or most of the time to all four items". These were recoded into two categories as high resilience (all 4 items) versus low resilience (less than 4 items). According to a study, the family resilience index scores showed a graded association with child flourishing. The adjusted odds of flourishing were three times greater for children with a score of 4 (compared to 0 or 1) and were smaller for children with a score of 2 or 3 (Bethell, Gombojav and Whitaker, 2019).

Validated tools measuring childhood resilience assets within the community or one that has been utilized in surveys nationally were not found. Therefore, questions consistent with established resilience measures (Child and Youth Resilience Measure) were used (Liebenberg et al., 2013) as well as the addition of having access to a trusted adult, which is a measure previously related to resilience and ACEs (Bellis et al., 2017). Participation in sports, clubs or organized activities was measured by the survey questions, “During the past 12 months did this child participate in: a sports team or did he or she take sports lessons after school or on weekends, any clubs or organizations after school or on weekends, and any other organized activities or lessons, such as music, dance, language, or other arts?”. These questions had responses of yes or no. Access to a trusted adult was measured by the question “Other than you

or other adults in your home, is there at least one other adult in this child's school, neighborhood, or community who knows this child well and who he or she can rely on for advice or guidance?" which had a response of yes or no. The supportive neighborhood variable was measured by the question "Does this child live in a supportive neighborhood?" This measure has been described in various contexts as social capital or neighborhood cohesion and was derived from responses to three sentences: 1) People within the neighborhood helped each other out, 2) People within the neighborhood watched out for each other's children and 3) Knowing where to get help in the community. Children were considered to reside in supportive neighborhoods if the responses were 'definitely agree' to at least one of the three sentences above and 'definitely agree' or 'somewhat agree' to the other two statements in the 2018 NSCH (US Census Bureau, 2019).

A cumulative continuous variable which measures community resilience was created with these three items (participation in sports, clubs or organized activities, access to a trusted adult and living in a supportive neighborhood). One point was assigned for "yes" or "agree" answers consistent with coding for the individual and family resilience measures. The community resilience category was grouped as 'yes to 0-1 item', 'yes to 2 items' and 'yes to all three items'. These were recoded into two categories as high resilience (all 3 items) versus low resilience (less than 3 items).

Additional Covariates of Interest

Other variables include socio-demographic information such as sex, age (3-5, 6-11 and 12-17), race/ethnicity, structure of the family (two married parents, two unmarried parents, single parent and nonparent/ other relative), educational attainment (less than high school education or

high school diploma and some college or college degree/ higher), insurance (uninsured, private and public insurance, private insurance, public insurance) and poverty level (<100% FPL, 100-199% FPL, 200-399% FPL, and ≥ 400% FPL). These variables were selected based on other studies that examined ACEs or mental health outcomes (Elmore & Crouch, 2020; Ghandour et al., 2019). Imputed values are provided by NSCH. The poverty level of the household and household educational attainment were multiply imputed using regression methods (US Census Bureau, 2020). Sex, race/ethnicity variables were missing <1% observations and were imputed through hot-deck imputation.

The study by Elmore, Crouch, & Kabir Chowdhury, (2020) showed that the mental health of caregivers could impact exposure to ACEs, resilience factors or mental health outcomes among children. The mental or emotional health of the parents or caregivers of the child was assessed as excellent, very good/good and fair/poor. Examples of positive childhood experiences or resilient factors include living and playing in safe and equitable environments (Sege & Harper Browne, 2017). A response of yes or no to the survey questions, "In your neighborhood is there a park/ playground" or "In your neighborhood is there a recreation center, community center, or boys' and girls' club " was used as responses for the variable 'opportunities for play and physical activity'. Living in a safe neighborhood was assessed by the question "To what extent do you agree with these statements about your neighborhood or community? This child is safe in our neighborhood?" The response options were examined as a dichotomous variable: definitely agree or somewhat agree as agree and somewhat disagree or definitely disagree as disagree.

A child health policy has been identified as increasing access to care in a medical home for children with special needs (National Resource Center for Patient-Centered Medical Home,

2020). The medical home variable measured by the NSCH was based on five characteristics that include: family-centered care, usual source of care, personal doctor or nurse, receiving the needed help and obtaining referrals. This assessed whether respondents received or did not receive care within a medical home.

Statistical Analysis

ACE and resilience exposures were described for the total study population by each mental health outcome (ADHD, anxiety, behavior disorders and depression). Chi-square analysis was utilized to examine the unadjusted relationship between ACE count (total number of ACEs), individual ACE measures, and mental health outcomes of interest. SAS survey procedures were used with survey design procedures (sampling weights, cluster, and stratum) to account for the complex survey design of NSCH in order to produce nationally representative results. Bi-variate analysis examining the unadjusted relationship between resilience factors (categories of individual, family and community) and mental health outcomes of interest were examined using a Chi-square test for independence.

Unadjusted and adjusted logistic regression models were conducted for each independent variable predicting mental health outcomes to obtain odd ratios. Demographic variables were included as potential confounders. Thus, the logistic regression models controlled for characteristics of children such as race, age, sex, insurance, adult education, family structure, income level and caregiver mental health. This is also consistent with other studies that examined adjusted models (C. D. Bethell et al., 2014; Elmore et al., 2020; Ghandour et al.,

2019). The independent ACEs variable was examined as a category of ≥4 or <4 ACEs. Resilience variables were examined as categorical predictors (high versus low).

Results

The proportions of male and female children were similar (51% and 49% respectively) (Table 3.1). Approximately 19% of the population were ages 3 to 5, 40% of the population were ages 6 to11 and 41% of the population were ages 12 to 17. Half of the population were Whites, 14% were Blacks and 26% were Hispanic. Majority of the population had private insurance (57%). Majority of the population lived with married parents (61%) and had parents or caregivers with a college degree or higher (70%). About twenty percent of the study population lived below the federal poverty line. About 90% of parents or caretakers of children reported excellent, very good or good health. Approximately 50% of children received care in a medical home. Majority of the study population (92%) agreed that they lived in a safe neighborhood and about 80% reported that they had opportunities for recreational and physical activity.

For the total study sample, 9% had current ADHD, 7% had current behavioral disorders, 8% had current anxiety and 4% had current depression (Table 3.1). ACE count and all resilience categories were significantly associated with all mental health outcomes among children aged 3-17 (Table 3.2).

ACEs Exposure

Among the study population, 8% of children experienced 4 or more ACEs when examined cumulatively. Parental divorce/separation was the most common ACE type (26%).

Fifteen percent of children experienced economic hardship. Nine percent of children lived with caretakers who suffered from substance abuse problems while 8% of children lived with caretakers who were mentally ill.

All ACE types were associated with all mental health outcomes. Children who experienced 4 or more ACEs compared to those with less than four ACEs were more likely to have ADHD (19% vs 8%), current behavior disorders (19% vs 6%), current anxiety (20% vs 7%) and current depression (15% vs 3%). Children who experienced economic hardship were more likely to have ADHD (13% vs 8%), current behavior disorders (14% vs 6%), current anxiety (14% vs 7%) and current depression (8% vs 3%) compared to those who did not experience economic hardship. Among children who experienced parental divorce or separation, 14% had ADHD, 12% had behavioral disorders, 12% had anxiety while 8% had depression, compared to 7%, 5%, 6% and 2% respectively of children who did not experience parental divorce or separation. For parental death, 17% of children with this experience had current ADHD, 13% had current behavior disorders, 13% had current anxiety and 10% had current depression compared to 8%, 7%, 8% and 3% respectively of children without this experience. Among children whose parents or guardian were incarcerated, 18% had current ADHD, 19% had current behavior disorders, 13% had current anxiety and 10% had current depression compared to 7%, 6%, 8% and 3% respectively among children whose parents were not incarcerated.

Household mental illness was the most common ACE type for all mental outcomes. For household mental illness, 22% with exposure had current ADHD, 21% had current behavior disorders, 26% had current anxiety and 19% had current depression compared to 7%, 6%, 7% and 2% respectively among children without exposure to mental illness. For neighborhood violence, 20% with exposure had current ADHD, 21% had current behavior disorders, 23% had

current anxiety and 18% had current depression compared to children without exposure to neighborhood violence (8%, 6%, 7% and 3% respectively). Among those with household substance abuse, 19% had ADHD, 20% had behavior disorders, 19% had anxiety and 13% had depression compared to children without exposure to household substance abuse (8%, 6%, 7% and 3% respectively). Children who experienced racial or ethnic discrimination compared to those who did not experience discrimination were more likely to have current ADHD (15% vs 8%), current behavior disorders (15% vs 7%), current anxiety (18% vs 8%) and current depression (12% vs 3%).

Resilience

Among the study population, 31% reported low individual resilience, 20% reported low family resilience and 88% reported low community resilience. Children whose caregivers reported low resilience in the individual resilience category compared to children of caregivers who had high individual resilience were more likely to have ADHD (19% vs 4%), current behavior disorders (18% vs 2%), current anxiety (17% vs 4%) and current depression (8% vs 2%). Children whose caregivers reported low resilience in the family resilience category compared to those who reported high family resilience were more likely to have ADHD (12% vs 8%), current behavior disorders (12% vs 6%), current anxiety (13% vs 7%) and current depression (8% vs 3%). Caregivers who reported low resilience for their children in the community resilience category compared to those who did not report low community resilience were more likely to have ADHD (9% vs 7%), current behavior disorders (7% vs 4%), current anxiety (8% vs 7%) and current depression (4% vs 2%).

Logistic Regression

After adjustment, ACE count remained strongly and positively related to all mental health outcomes; the strongest relationship was with depression (Table 3.3). Children with 4 or more ACE counts compared to children with less than 4 ACE counts had higher odds of ADHD (aOR 2.03; CI: 1.52-2.72), behavior disorders (aOR 2.47; CI: 1.81-3.37), anxiety (aOR 2.66; CI: 2.00-3.53) and depression (aOR 4.53; CI: 3.13-6.54).

In the adjusted model, individual resilience remained negatively associated with all mental health outcomes with behavioral disorders having the least odds (Table 3.3). Children with high individual resilience compared to children with low individual resilience had lesser odds of ADHD (aOR 0.19; CI: 0.15-0.22), behavior disorders (aOR 0.11; CI: 0.09-0.14), anxiety (aOR 0.21; CI: 0.18-0.25) and depression (aOR 0.20; CI: 0.13-0.29). Children with high family resilience had lesser odds of ADHD (aOR 0.71; CI: 0.56-0.91), behavior disorders (aOR 0.61; CI: 0.46-0.81), anxiety (aOR 0.57; CI: 0.50-0.72) and depression (aOR 0.39; CI: 0.27-0.57) compared to children with low family resilience. Children with high community resilience had lesser odds of ADHD (aOR 0.67; CI: 0.52-0.88), behavior disorders (aOR 0.64; CI: 0.42-0.97), anxiety (aOR 0.70; CI: 0.54-0.92) and depression (aOR 0.46; CI: 0.31-0.68) compared to children with low community resilience.

Discussion

Results from this nationally representative data for children in the US confirm the prevalence of ACEs, significant relationships with negative mental health outcomes and the fact that the effect of ACEs starts early in childhood. Resilience measures were significantly

associated with decreasing mental health disorders in children with individual resilience having the largest impact.

Exposure to ACEs among the study population was common as at least 8% experienced 4 or more ACEs with parental divorce or separation having the greatest prevalence, which is consistent with prior studies (Crouch, Probst, et al., 2019). This suggests that at children living in single parent households are more likely to utilize mental health services.

Economic hardship was the second highest prevalent ACE type. Thus, it is important to consider stressors like poverty during young adulthood instead of focusing solely on ACEs. This also underscores the importance of including economic hardship as a type of ACE, which has been included in the NSCH, survey but not in other ACE surveys. The socio-economic status of children provides additional context to the various ways ACEs could occur, which enables more targeted preventive opportunities.

Thus far, few studies have investigated the relationship between ACEs, internalizing and externalizing disorders separately. Thus, it is expected that distinct ACE types are associated differently with internalizing and externalizing disorders. Among the four mental health outcomes, anxiety had the highest prevalence of neighborhood violence and mental illness of parents. Evaluation of the outcomes of depression and anxiety separately revealed differential effects of exposure to ACEs as associations were stronger with anxiety for all types of ACEs. Also, the prevalence of ACE types varied for ADHD and behavioral disorders. Thus, these findings highlight the importance of examining the relationship between exposure to ACEs and internalizing and externalizing disorders separately.

Studies have linked ACEs with higher chronic diseases and costs of care across the life course of an individual (Chartier et al., 2010; Florence et al., 2013). Such results make addressing the history of ACEs pertinent to medical homes and Accountable Care Organization (ACO) models of care. Some ACOs and patient-centered medical homes now recognize the costs of not addressing ACEs and the opportunity to ameliorate the health of individuals and the population through trauma-informed approaches (Fraser et al., 2014) .

The long-term goal of eradicating ACEs requires the immediate consideration of generating individual, family and community assets with the capacity to counteract the negative effects associated with exposure to ACEs. Developing resilience has been broadly considered as the main component of such assets, despite small empirical data regarding its benefits. The findings here show that the increased possession of childhood resilience is strongly related to better mental health, with individual childhood resilience having a greater impact on mental health well-being.

This study demonstrates the need for promoting child resiliency to tackle mental health disorders in children and adolescents. The promotion of positive childhood experiences illustrates the advancements in prevention science to decrease the effects of ACEs but the creation of such experiences is needed to develop resilience in the child and within the family (Shonkoff, 2016). Yet, the development of individual child resilience depends on both the engagement of families and communities, as well as stakeholders in social services, healthcare, and education; thus, the importance of the social ecological model as a whole. Therefore, new and continued efforts to evaluate current resilience factors within local communities, states and nationwide are needed.

The results from the family resilience showed that a nurturing home environment and positive family functioning can help to reduce such adverse outcomes. This reinforces the need to expand resources to children from at-risk families. It has been shown that resilience measures such as family closeness may protect youths from other risk factors related to the diagnoses of mental health disorders (Ghandour et al., 2012).

The inclusion of resilience measures in customarily collected public health surveillance data can help to advance knowledge and monitor progress towards promoting resilience. Attention should be given to the development of these measures that reflect resilience among children, families and their communities. A joint inventory of ACE and resilience measures assessed here may improve efforts to evaluate needs, focus interventions and engage persons in addressing their adversities through leveraging present assets and strengths. Strategies to conduct screening for ACEs such as those taking place in California's Medicaid program could benefit from integrated assessments for resilience. The measurement of ACEs and resilience at the state level analogous to that of the California Medicaid program is a strategy to develop target efforts within individual states (California Pan Ethnic Health Network, 2019).

It is imperative that population-based data on ACEs and resilience is continuously collected. These data should be enriched by integrating longitudinal cohorts of children to explicate causality and the multifaceted dynamics related to the occurrence and effect of ACEs and the role of resilience, as well as the advancement of health care interventions such as the medical home. Qualitative research studies that explore cases in which ACEs are prevalent but hypothesized detrimental outcomes are not observed might also aid to develop the understanding of and strategies to avert negative effects of ACEs across life.

Limitations

This study is subject to few limitations. First, the lack of questions on emotional, physical and sexual abuse did not allow one to assess their relationships with mental health disorders. However, the NSCH does not include such questions since data regarding ACE exposure is collected through parents/caregivers. Also, reports regarding ACE exposures might be over reported or under reported. Next, non-response bias could distort findings, however, the application of sample weights to the analyses were meant to reduce resulting bias. Also, there may be the problem of selective participation during survey collection. Lastly, causal inferences cannot be formed due to the cross-sectional nature of the study.

Conclusions

The findings from this study demonstrate associations between ACEs, resilience and mental health disorders. Differential impacts of ACEs on mental health outcomes were found emphasizing the importance of assessing internalizing and externalizing disorders separately.

The results of this study may contribute to improved screening initiatives for mental health outcomes and prevention efforts to decrease the prevalence of ACEs among children. Screenings and interventions may be beneficial to prevent problems during adulthood. Findings hold promise for community, state and nationwide efforts to attain positive health outcomes by advancing the largely untapped potential to promote resilience in spite of adversity.

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Table 3.1

Characteristics of Study Population in Total and by Current Mental Health Status Among Respondents to the 2018 NSCH

Characteristic		Current ADHD		Current Behavior Disorder		Current Anxiety		Current Depression	
	Total	Yes	No	Yes	No	Yes	No	Yes	No
	N [a](%)[b]	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Total Sample	26572	2677 (8.6)	23895 (91.4)	1901 (6.9)	24671 (93.1)	2719 (8.0)	23853 (92.0)	1198 (3.7)	25374 (96.3)
Individual Level									
Sex		***		***		**		*	
Male	13892 (51.1)	1845 (11.5)	12047 (88.5)	1340 (8.7)	12552 (91.3)	1277 (7.1)	12615 (92.9)	531 (3.1)	13361 (96.9)
Female	12680 (48.9)	832 (5.6)	11848 (94.4)	561 (5.0)	12119 (95.0)	1442 (9.0)	11238 (91.0)	667 (4.3)	12013 (95.7)
Race/Ethnicity		***		**		***		^	
Hispanic	3129 (25.6)	248 (6.4)	2881 (93.6)	221 (5.8)	2908 (94.2)	267 (5.9)	2862 (94.1)	121 (2.6)	3008 (97.4)
White, Non-Hispanic	18388 (49.9)	1981 (10.0)	16407 (90.0)	1281 (6.9)	17107 (93.1)	2086 (10.3)	16302(89.7)	884 (4.2)	17504 (95.8)
Black, Hispanic	1739 (13.8)	193 (9.7)	1546 (90.3)	175 (9.7)	1564 (90.3)	122 (5.6)	1617 (94.4)	80 (4.2)	1659 (95.8)
Other, Non-Hispanic	3316 (10.6)	255 (6.2)	3061 (93.8)	224 (5.7)	3092 (94.3)	244 (5.7)	3072 (94.3)	113 (3.1)	3203 (96.9)
Age		***		***		***		***	
3-5 years	4618 (19.3)	65 (1.4)	4553 (98.6)	205 (4.3)	4413 (95.7)	92 (2.1)	4526 (97.9)	8 (0.3)	4610 (99.7)
6-11 years	9367 (40.2)	1024 (9.8)	8343 (90.2)	863 (9.2)	8504 (90.8)	850 (7.6)	8517 (92.4)	187 (2.1)	9180 (97.9)
12-17 years	12587 (40.5)	1588 (10.9)	10999 (89.1)	833 (5.9)	11754 (94.1)	1777 (11.3)	10810 (88.7)	1003 (6.9)	11584 (93.1)
Insurance Status		***		***		*		***	
Public only	5333 (30.1)	754 (10.2)	4579 (89.8)	729 (10.5)	4604 (89.5)	714 (8.4)	4619 (91.6)	379 (5.1)	4954 (94.9)
Private only	18629 (57.1)	1577 (7.6)	17052 (92.4)	880 (4.5)	17749 (95.5)	1679 (7.5)	19650 (92.5)	661 (2.7)	17968 (97.3)
Public and private	1005 (3.9)	214 (15.8)	791 (84.2)	192 (14.5)	813 (85.5)	197 (13.8)	808 (86.2)	97 (8.8)	908 (91.2)
Uninsured	1605 (8.9)	132 (6.6)	1473 (93.4)	100 (6.5)	1505 (93.5)	129 (8.0)	1476 (92.0)	61 (2.8)	1544 (97.2)
Family Level									
Family Structure		***		***		^		***	
Non-Parent/ Other Relative	1594 (8.4)	263 (12.3)	1331 (87.7)	241 (11.9)	1353 (88.1)	205 (8.6)	1389 (91.4)	113 (5.1)	1481 (94.9)
Single Parent	5268 (22.8)	657 (10.1)	4611 (89.9)	545 (10.0)	4723 (90.0)	690 (9.8)	4578 (90.2)	349 (5.6)	4919 (94.4)
Two Parents Unmarried	1666(8.0)	178 (9.1)	1488 (91.0)	151 (8.2)	1515 (91.8)	174 (8.1)	1492 (91.9)	87 (4.3)	1579 (95.7)
Two Parents Married	18044 (60.7)	1579 (7.5)	16465 (92.5)	964 (4.8)	17080 (95.2)	1650 (7.3)	16394 (92.7)	649 (2.7)	17395 (97.3)
Household Educational Level						^			
< High school/ High school	4405 (29.8)	416 (7.5)	3989 (92.5)	416 (7.5)	3989 (92.5)	452 (6.8)	3953 (93.2)	236 (4.4)	4169 (95.6)

Some college or more	22167(70.2)	1485 (6.6)	20682 (93.4)	1485 (6.6)	20682 (93.4)	2267 (8.5)	19900 (91.5)	962 (3.4)	21205 (96.6)
Income/Poverty Level				***				*	
<100% FPL;	3156 (19.7)	366 (9.4)	2790 (90.6)	366 (9.4)	2790 (90.6)	379 (8.3)	2777 (91.7)	208 (5.1)	2948 (94.9)
100-199% FPL;	4366 (22.1)	423 (8.0)	3943 (92.0)	423 (8.0)	3943 (92.0)	495 (7.6)	3871 (92.4)	247 (4.2)	4119 (95.8)
200-399% FPL;	8129 (27.1)	534 (6.5)	7595 (93.5)	534 (6.5)	7595 (93.5)	807 (8.3)	7322 (91.7)	335 (2.8)	7794 (97.2)
≥ 400% FPL	10921 (31.1)	578 (4.8)	10343 (95.2)	578 (4.8)	10343 (95.2)	1038 (7.9)	9883 (92.1)	408 (3.2)	10513 (96.8)
Caregiver Mental Health		***		***		***		***	
Excellent, very good/good	24260 (88.3)	2280 (7.9)	21980 (92.1)	1519 (5.9)	22741 (94.1)	2332 (7.4)	21928 (92.6)	974 (3.0)	23286 (97.0)
Fair/poor	672 (2.9)	151 (23.2)	521 (76.8)	163 (25.1)	509 (74.9)	205 (28.8)	467 (71.2)	122 (18.3)	550 (81.7)
No response	1640 (8.8)	246 (11.1)	1394 (88.9)	219 (10.7)	1421 (89.3)	182 (7.9)	1458 (92.1)	102 (5.1)	1538 (94.9)
Community/Societal Opportunities for play/activity									
Yes	19965 (77.2)	1944 (8.5)	18021 (91.5)	1408 (6.8)	18557 (93.2)	2038 (7.9)	17927 (92.1)	869 (3.7)	19096 (96.3)
No	6607 (22.8)	733 (9.1)	5874 (90.9)	493 (7.1)	6114 (92.9)	681 (8.4)	5926 (91.6)	329 (3.7)	6278 (96.3)
Safe Neighborhood						^		*	
Agree	25207 (92.4)	2495 (8.5)	22712 (91.5)	1746 (6.7)	23461 (93.3)	2518 (7.8)	22689 (92.2)	1111 (3.4)	24096 (96.6)
Disagree	1365 (7.6)	182 (10.0)	1183 (90.0)	155 (9.0)	1210 (91.0)	201 (10.8)	1164 (89.2)	87 (6.5)	1278 (93.5)
Medical Home		*		***		***		***	
Yes	14165 (47.8)	1284 (7.6)	12881 (92.4)	736 (5.3)	13429 (94.7)	1192 (6.4)	12973 (93.6)	437 (2.3)	13728 (97.3)
No	12407 (52.2)	1393 (9.5)	11014 (90.5)	1165 (8.3)	11242 (91.7)	1527 (9.5)	10880 (90.5)	761 (4.6)	11646 (95.4)

^p≤ .05 *p ≤ .01 **p ≤ .001 ***p ≤ .0001 [a] Unweighted frequencies [b] Weighted percent

Table 3.2

Adverse Childhood Experiences and Resilient Factors Among Study Population in Total and by Current Mental Health Status Among Respondents to the 2018 NSCH

Characteristic		Current ADHD		Current Behavior Disorder		Current Anxiety		Current Depression	
	Total	Yes	No	Yes	No	Yes	No	Yes	No
	N[a] (%)[b]	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Total Sample	26572	2677 (8.6)	23895 (91.4)	1901 (6.9)	24671 (93.1)	2719 (8.0)	23853 (92.0)	1198 (3.7)	25374 (96.3)
ACE Exposure									
ACE Score		***		***		***		***	
<4 ACEs	24678 (91.7)	2258 (7.7)	22420 (92.3)	1510 (5.7)	23168 (94.3)	2251 (7.0)	22427 (93.0)	897 (2.6)	23781 (97.4)
≥4 ACEs	1894 (8.3)	419 (18.7)	1475 (81.3)	391 (19.3)	1503 (80.7)	468 (19.8)	1426 (80.2)	301 (15.0)	1593 (85.0)
Economic Hardship		***		***		***		***	
Yes	3426 (15.3)	538 (12.7)	2888 (87.3)	520 (14.4)	2906 (85.6)	658 (14.4)	2768 (85.6)	332 (8.0)	3094 (92.0)
No	23146 (84.7)	2139 (7.9)	21007 (92.1)	1381 (5.5)	21765 (94.5)	2061 (6.9)	21085 (93.1)	866 (2.9)	22280 (97.1)
Divorce/ Separation		***		***		***		***	
Yes	6635 (25.7)	1030 (13.9)	5605 (86.1)	815 (12.2)	5820 (87.8)	1031 (12.4)	5604 (87.6)	569 (7.5)	6066 (92.5)
No	19937 (74.3)	1647 (6.8)	18290 (93.2)	1086 (5.0)	18851 (95.0)	1688 (6.5)	18249 (93.5)	629 (2.4)	19308 (97.6)
Death		***		***		**		***	
Yes	879 (3.5)	170 (16.7)	709 (83.3)	125 (12.8)	754 (87.2)	157 (13.1)	722 (86.9)	105 (10.2)	774 (89.8)
No	25693 (96.5)	2507 (8.3)	23186 (91.7)	1776 (6.7)	23917 (93.3)	2562 (7.9)	23131 (92.1)	1093 (3.4)	24600 (96.6)

Incarceration		***		***		***		***	
Yes	1889 (8.2)	413 (18.4)	1476 (81.6)	368 (18.6)	1521 (81.4)	359 (12.9)	1530 (87.1)	231 (9.8)	1658 (90.2)
No	24683 (91.8)	2264 (7.7)	22419 (92.3)	1533 (5.8)	23150 (94.2)	2360 (7.6)	22323 (92.4)	967 (3.1)	23716 (96.9)
Domestic Violence		***		***		***		***	
Yes	1483 (6.2)	317 (18.2)	1166 (81.8)	305 (20.0)	1178 (80.0)	331 (16.4)	1152 (83.6)	224 (14.1)	1259 (85.9)
No	25089 (93.8)	2360 (8.0)	22729 (92.0)	1596 (6.0)	23493 (94.0)	2388 (7.5)	22701 (92.5)	974 (3.0)	24115 (97.0)
Neighborhood Violence		***		***		***		***	
Yes	1080 (4.7)	280 (20.0)	800 (80.0)	253 (21.3)	827 (78.7)	307 (22.7)	773 (77.3)	203 (17.7)	877 (82.3)
No	25492 (95.3)	2397 (8.1)	23095 (92.0)	1648 (6.2)	23844 (93.8)	2412 (7.3)	23080 (92.7)	995 (3.0)	24497 (97.0)
Mental Illness		***		***		***		***	
Yes	2468 (8.0)	544 (22.1)	1924 (77.9)	482 (20.9)	1986 (79.1)	694 (25.8)	1774 (74.2)	441 (19.0)	2027 (81.0)
No	24104 (92.0)	2133 (7.4)	21971 (92.6)	1419 (5.7)	22685 (94.3)	2025 (6.5)	22079 (93.5)	757 (2.3)	23347 (97.7)
Substance Abuse		***		***		***		***	
Yes	2767 (8.8)	542 (19.2)	2225 (18.8)	477 (19.8)	2290 (80.4)	595 (19.0)	2172 (81.0)	362 (13.4)	2405 (86.6)
No	23805 (91.2)	2135 (7.6)	21670 (92.4)	1424 (5.6)	2238 (94.4)	2124 (7.0)	21681 (93.0)	836 (2.7)	22969 (97.3)
Discrimination		**		***		***		***	
Yes	970 (4.4)	139 (14.9)	831 (85.1)	126 (15.3)	844 (84.7)	186 (18.2)	784 (81.8)	107 (11.9)	863 (88.1)
No	25602 (95.6)	2538 (8.3)	23064 (91.7)	1775 (6.5)	23827 (93.5)	2533 (7.6)	23069 (92.4)	1091 (3.3)	24511 (96.7)
Individual Resilience		***		***		***		***	

Low	7504 (30.9)	1819 (19.4)	5685 (80.6)	1526 (17.8)	5978 (82.2)	1713 (16.8)	5791 (83.2)	820 (8.2)	6684 (91.8)
High	19068 (69.1)	858 (3.8)	18210 (96.2)	375 (2.0)	18693 (98.0)	1006 (4.1)	18062 (95.9)	378 (1.6)	18690 (98.4)
Family Resilience		***		***		***		***	
Low	4851 (20.1)	727 (12.2)	4124 (87.8)	635 (11.7)	4216 (88.3)	815 (13.3)	4036 (86.7)	433 (7.7)	4418 (92.3)
High	21721 (79.9)	1950 (7.7)	19771 (92.3)	1266 (5.7)	20455 (94.3)	1904 (6.7)	19817 (93.3)	765 (2.7)	20956 (97.3)
Community Resilience		*		*				*	
Low	22485 (88.1)	2376 (8.8)	20109 (91.2)	1756 (7.3)	20729 (92.7)	2377 (8.1)	20108 (91.9)	1093 (3.9)	21392 (96.1)
High	4087 (11.9)	301 (6.9)	3786 (93.1)	145 (4.0)	3942 (96.0)	342 (7.3)	3745 (92.7)	105 (2.0)	3982 (98.0)

^p≤ .05 *p ≤ .01 **p ≤ .001 ***p ≤ .0001 [a] Unweighted frequencies [b] Weighted percent

Table 3.3

Unadjusted and Adjusted Odds Ratios and 95% Wald Confidence Intervals for Current Mental Health Outcomes by ACEs and Resilience Among Respondents to the 2018 NSCH

Characteristic	Current ADHD		Current Behavior Disorder		Current Anxiety		Current Depression	
	OR (95% CI)	aOR (95%CI)[a]	OR (95% CI)	aOR (95%CI)[a]	OR (95% CI)	aOR (95%CI)[a]	OR (95% CI)	aOR (95%CI)[a]
ACE Exposure								
ACE Score								
<4 ACEs	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
≥4 ACEs	2.76 (2.19-3.47) ***	2.03 (1.52-2.72) ***	3.93 (3.08-5.02) ***	2.47 (1.81-3.37) ***	3.31 (2.63-4.17) ***	2.66 (2.00-3.53) ***	6.52 (4.91-8.67) ***	4.53 (3.13-6.54) ***
Individual Resilience								
Low	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
High	0.16 (0.14-0.19) ***	0.19 (0.15-0.22) ***	0.09 (0.08-0.12) ***	0.11 (0.09-0.14) ***	0.21 (0.18-0.25) ***	0.21 (0.17-0.26) ***	0.18 (0.14-0.24) ***	0.20 (0.13-0.29) ***
Family Resilience								
Low	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
High	0.60 (0.50-0.72) ***	0.68 (0.56-0.82) ***	0.45 (0.37-0.55) ***	0.54 (0.43-0.67) **	0.46 (0.39-0.55) ***	0.52 (0.43-0.62) ***	0.33 (0.26-0.42) ***	0.42 (0.32-0.56) ***
Community Resilience								
Low	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
High	0.76 (0.59-0.98) ^	0.67 (0.52-0.88) *	0.53 (0.36-0.79) *	0.64 (0.42-0.97) **	0.89 (0.69-1.14)	0.70 (0.54-0.92) *	0.50 (0.34-0.74) **	0.46 (0.31-0.68) **

a Adjusted odds ratio adjusted for characteristics of study population: race, age, sex, insurance, adult education, family structure, income level, and caregiver mental health

^p≤ .05 *p ≤ .01 **p ≤ .001 ***p ≤ .0001

Chapter 4. The Role of Resilience in Moderating the Effect of ACEs on Mental Health Outcomes Among Children & Adolescents

Abstract

Introduction: Mental health outcomes such as attention-deficit hyperactivity disorder (ADHD), behavior disorders, anxiety and depression and ACEs are common disorders among children in the United States. Little is known on how potential resilient factors may moderate the relationship between exposure to ACEs and mental health outcomes in children. This study fills this gap by examining the associations between ACEs and resilience on mental health outcomes. In addition, multiple types of resilience measures are categorically analyzed for how they moderate cumulative ACE exposure on mental health outcomes among children and adolescents.

Methods: Data were drawn from the 2018 National Survey of Children's Health. Logistic regression examined the association between ACEs, resilience and mental health outcomes. Interactions were examined between ACE exposure and resiliency categories on mental health outcomes. SAS survey procedures and sampling weights were used.

Results: Regressions demonstrated associations between mental health outcomes and resiliency as well as high ACEs where ACE exposure and low resiliency was associated with an increased likelihood of mental health outcomes. There were significant interactions between exposure to ACEs and family resilience for current behavioral disorders ($p < .01$), anxiety ($p < .01$) and depression ($p < .0001$) as well as significant interactions between ACE exposure and community resilience for depression ($p < .05$). Upon stratification, the presence of individual resilience decreased the odds ADHD (aOR: 0.14; CI: 0.08-0.23), behavioral disorders (aOR: 0.10; CI: 0.06-0.16), anxiety (aOR: 0.21; CI: 0.13-0.35) and depression (aOR: 0.24; CI: 0.13-0.43) as well as the presence of community resilience decreased the odds of depression (aOR: 0.25; CI: 0.10-0.61) among individuals who had experienced 4 or more ACEs.

Conclusion: High individual resilience may decrease the impact of ACE exposure on mental health outcomes and high community resilience may decrease the impact of ACE exposure on depression. These results illustrate the need to promote resilience measures, individually analyze resilience measures and build resiliency for tacking mental health problems and reducing the negative impact of trauma in children.

Keywords: adverse childhood experiences, resiliency, moderation, mental health

Introduction

Adverse childhood experiences (ACEs) are an important measure that reflects traumatic or stressful events (such as abuse, neglect and family dysfunction) that occur during childhood. The relationship between ACEs and longer-term health outcomes, behaviors disease, cognitive impairment, and premature mortality has been well documented (Felitti et al., 1998). These experiences can occur in various combinations during childhood and the cumulative experience of various types of trauma has been shown to have greater negative implications (Blum et al., 2019; Chang et al., 2019).

ACEs trigger stress responses in children that could be positive, tolerable or toxic. Tolerable stress is due to severe and longer difficulties and toxic stress is due to prolonged adversity (Shonkoff et al., 2012) Toxic stress can create structural changes in the brain and lead to impaired memory, learning difficulties, and compromised mood control in the absence of any buffers or protective factors to create a positive stress response (Shonkoff et al., 2012).

Although previous research has noted the association between ACEs and adverse health outcomes, the impact is not uniform, suggesting other factors may be important for moderating the long-term impact of ACEs. One such factor is resilience. Resilience can be described as a dynamic and interactive process whereby individuals increase the ability through which they navigate and negotiate with their psychological, biological, familial, social, cultural and community resources within the context of significant adversity (Zimmerman, 2013). In the context of a socio-ecological model, resilience may occur across individual, familial and

community factors that allow children to adapt, cope and take advantage of assets when faced with significant stress.

While the initial ACEs studies were important for operationalizing the measure and examining associations with adverse health outcomes, two important limitations have been noted. The initial studies focused on adult outcomes, and they also do not account for protective measures that may also moderate the effect of ACEs on health (McEwen & Gregerson, 2019) (Gartland et al., 2019). This study addresses these gaps by examining ACEs among children and examining the moderating role of protective factors on observed outcomes. Furthermore, there is a lack of studies examining childhood resilience assets in the community (Bellis et al., 2018). Even when children view their homes as safe havens, the dysfunction of their immediate neighborhood can have negative effects (Moore & N. Ramirez, 2016).

There is limited research on how potential resilient factors mitigate the relationship between exposure to ACEs and common mental health outcomes in children. This paper utilizes data from a nationally representative data to fill these gaps by examining how individual, family, and community measures of resilience moderate the relationship between ACEs and mental health outcomes such as attention-deficit hyperactivity disorder (ADHD), behavior disorders, anxiety and depression in children within the US.

Methods

Study Design & Study Population

A cross-sectional study using secondary data from the 2018 National Survey of Children's Health (NSCH) was utilized. This survey assesses the health and well-being of children. The 2018 NSCH sample consisted of 176,000 households across the nation from the Census Master Address File. A screener questionnaire identified occupied households with eligible children between the ages of 0-17 years (US Census Bureau, 2019). There was a total of 30,530 surveys completed nationally and approximately 600 surveys per state. The weighted overall response rate for the survey was 43.1% (Data Resource Center for Child and Adolescent Health, 2019). A detailed description of the survey design is available elsewhere (US Census Bureau, 2019). The study population consisted of noninstitutionalized children aged 3 through 17 years within the U.S whose parents or guardians completed the survey.

Outcome Variables

The dependent variables were four mental health outcomes: ADHD, anxiety, behavior disorders and depression. The presence of current mental conditions was assessed using survey parent/caregiver's responses to questions asking whether the doctor had ever told the parent/caregiver that the child had ADHD, anxiety, behavior disorders or depression (yes/no). If yes, a secondary question asked whether the child currently had the condition. A dichotomous variable measuring whether the child currently has the condition was created.

Independent Variables of Interest

ACEs and resiliency are the primary independent variables. The questions regarding ACEs were derived from modified versions of the CDC and Kaiser Permanente ACE study (Felitti et al., 1998). Within the NSCH dataset, there are nine items that measure exposure to ACEs: socio-economic hardship, parental separation or divorce, parental death, parental incarceration, witnessing household violence, witnessing neighborhood violence, household mental illness, household substance abuse, and racial/ethnic discrimination (details are provided in the appendix). The NSCH did not include questions about physical abuse, sexual abuse or neglect to reduce underreporting due to social desirability bias based on recommendations by a technical expert panel during the testing of the screening instrument (C. D. Bethell et al., 2017).

All ACE measures were dichotomized to measure whether the child had experienced the ACE or not. Participants received one point per question if they responded yes. The aggregate ACEs count was calculated as the sum of "yes" responses across the questions. This approach can be compared to other studies (Balistreri, 2015; Blum et al., 2019; Chang et al., 2019). A categorical measure of ACE count was constructed to represent children with <4 ACEs and ≥ 4 ACEs. This cut-off point has been shown to be a valid threshold even for studies that used the NSCH, where persons who had four or more ACEs had a higher probability of adverse health outcomes (Elmore et al., 2020; Elmore & Crouch, 2020; Felitti et al., 1998; Kerker et al., 2015; McKelvey et al., 2016).

The socio-ecological model categorized resilient factors at the individual, family and community levels. Resilience at the individual level for children between the ages of 6 and 17 is

indicated by an established three-item index within the NSCH data set. These questions were developed by a technical expert panel based upon a review of positive health indicators (C. D. Bethell et al., 2019). Questions measuring children's persistence in completing tasks, interest and curiosity in learning new things, and capacity to regulate emotions were used to measure resilience at the individual level. Children were grouped according to whether they demonstrated 0–1, 2 or all 3 flourishing items. These were dichotomized into two categories as high resilience (all 3 items) and low resilience (less than 3 items).

For children below 6 years, four questions were asked that aimed to capture resilience at the individual level that include discovery and curiosity about learning, attachment with parent, and contentment with life. Children were grouped according to whether they demonstrated 0–2, 3, or all 4 flourishing items. These were dichotomized into two categories as high resilience (all 4 items) and low resilience (less than 4 items). Children with a score of three for ages 6-17 years or four for ages 6 months-5 years are usually classified as flourishing (C. D. Bethell et al., 2019).

Resilience at the family level was measured by a four-item family resilience index (FRI) which is an established index within the dataset (C. D. Bethell et al., 2019). The index asked parents, "When your family faces problems, how often are you likely to": "talk together about what to do," "work together to solve our problems," "know we have strengths to draw on," and "stay hopeful even in difficult times". The family resilience index score was grouped into the following categories: 'all or most of the time to 0-1 items', 'all or most of the time to 2-3 items' and "all or most of the time to all four items". These were dichotomized into two categories as high resilience (all 4 items) and low resilience (less than 4 items). According to a study, the

adjusted odds of child flourishing were highest for children with family resilience index scores score of 4 (Bethell, Gombojav and Whitaker, 2019).

Validated tools that measure childhood resilience within the community or one that has been used in surveys nationally were not found. Thus, questions consistent with established resilience measures such as the Child and Youth Resilience Measure were utilized (Liebenberg et al., 2013) in addition to having access to a trusted adult or mentor, which is a measure previously related to resilience and ACEs (Bellis et al., 2017). A variable to assess participation in sports, clubs or organized activities was examined by the survey questions, "During the past 12 months did this child participate in: a sports team or did he or she take sports lessons after school or on weekends, any clubs or organizations after school or on weekends, and any other organized activities or lessons, such as music, dance, language, or other arts?" Access to a trusted adult was evaluated by the survey question "Other than you or other adults in your home, is there at least one other adult in this child's school, neighborhood, or community who knows this child well and who he or she can rely on for advice or guidance?" Residence in a supportive neighborhood was measured by the question "Does this child live in a supportive neighborhood?" A cumulative continuous variable was created to measure community resilience using these three items. One point was awarded for answers of "yes" or "agree" consistent with coding for the individual and family resilience measures. These were dichotomized into two categories as high resilience (all 3 items) and low resilience (less than 3 items).

Data Analysis

Characteristics of the study population are described. The main effects of ACEs and resilience variables as predictors of mental health outcomes (ADHD, anxiety, behavior disorders and depression) were examined using logistic regression to obtain adjusted odd ratios. Mental health outcomes significantly associated with both resilience and ACEs were examined in interaction models. The ameliorative potential of resilience was examined by testing moderation effects. ACE exposure was interacted with the dichotomous resilience category in adjusted logistic regression models. Least square means were used to estimate the predicted values of each mental health outcomes at varying levels of ACE exposure and resilience. These values are presented as odds ratios comparing 4 or more ACES and high resilience to 4 or more ACES and low resilience for each mental health outcomes, as appropriate.

Results

Approximately 51% of the population were males and 49% were females. 19% of the population were between ages 3 and 5, 40% of the population were between ages 6 and 11, and 41% of the population were between ages 12 and 17. Fifty percent of the population were Whites, 26% were Hispanic and 14% were Blacks. About 60% of the population had private insurance only. About 61% of children lived with married parents. Majority of children had parents or caregivers who had some college education or higher (70%). Approximately twenty percent of the study population lived below the federal poverty line. Eighty-eight percent of parents or caretakers of children reported excellent, very good or good health. Approximately half of the study population received care in a medical home. Approximately 92% agreed that

they lived in a safe neighborhood and about 80% reported that they had opportunities for recreation or physical activity within their community.

Nine percent of the study population had current ADHD, 7% had current behavioral disorders, 8% had current anxiety and 4% had current depression. ADHD and behavior disorders were most common among males while anxiety and depression were most common for females. ADHD and anxiety were most common for White children, behavior disorders were most common for Black children while White and Black children were equally likely to have depression. Children with public and private insurance were most likely to experience all mental health outcomes. ADHD and behavior disorders were most common for children living with relatives or non-parents while anxiety and depression were most common for children living in single parent households. Behavior disorders and depression were most common for children living in households with a family income below 100% Federal Poverty Level. Children who had caregivers with fair or poor mental health as well as those who did not receive care in a medical home were more likely to have all four mental health outcomes. Anxiety and depression were most common for children who did not reside in safe neighborhoods.

Among children with more than four ACEs, 6% reported high individual resilience, 6% reported high family resilience and 3% reported high community resilience compared to 13%, 19% and 9% of children with low individual, family and community resilience respectively (Table 4.2). Children exposed to four or more ACEs had higher odds of ADHD (aOR 2.13; CI: 1.68-2.71), behavior disorders (aOR 3.00; CI: 2.34-3.86), anxiety (aOR 2.66; CI: 2.09-3.38) and depression (aOR: 5.23; CI: 3.89-7.03) compared to children exposed to less than four ACEs (Table 4.3). Children with high individual resilience had lesser odds of ADHD (aOR 0.17; CI: 0.14-0.20), behavior disorders (aOR 0.10; CI: 0.08-0.13), anxiety (aOR 0.22; CI: 0.19-0.27) and

depression (aOR 0.21; CI: 0.16-0.28) compared to children with low individual resilience. In model 4, with the interaction term introduced, the strength of the association between ACEs and mental health outcomes was reduced while the association between individual resilience and mental health outcomes remained the same.

The results with ACEs and family resilience category as predictors of mental health outcomes are shown in Table 4.4 (model 3). Children exposed to four or more ACEs had higher odds of ADHD (aOR 2.48; CI: 1.96-3.16), behavior disorders (aOR 3.32; CI: 2.59-4.28), anxiety (aOR 2.78; CI: 2.17-3.55) and depression (aOR 5.18; CI: 3.71-7.23) compared to children exposed to less than four ACEs. Children with high family resilience had lesser odds of ADHD (aOR 0.70; CI: 0.58-0.85), behavior disorders (aOR 0.57; CI: 0.46-0.69), anxiety (aOR 0.55; CI: 0.46-0.67) and depression (aOR 0.46; CI: 0.34-0.63) compared to children with low family resilience.

The results with ACEs and community resilience predictors of mental health outcomes are shown in Table 4.5 (model 3). Children exposed to four or more ACEs had higher odds of ADHD (aOR 2.72; CI: 2.16-3.43), behavior disorders (aOR 3.80; CI: 2.98-4.86), anxiety (aOR 3.31; CI: 2.63-4.17) and depression (aOR 6.31; CI: 4.75-8.39) compared to children exposed to less than four ACEs. Compared to children with low community resilience, children with high community resilience had lesser odds of behavioral disorders (aOR 0.60; CI: 0.41-0.89) and depression (aOR 0.62; CI: 0.42-0.93). In model 4, with the interaction term introduced, children with high community resilience had lesser odds of behavioral disorders (aOR 0.57; CI: 0.38-0.88).

Children with four or more ACEs and high individual resilience compared to children with four or more ACEs and low individual resilience had lesser odds of ADHD (Table 4.6; aOR

0.14; CI: 0.08-0.23), behavior disorders (aOR 0.10; CI: 0.06-0.16), anxiety (aOR 0.21; CI: 0.13-0.35) and depression (aOR 0.24; CI: 0.13-0.43). The presence of community resilience decreased the odds of depression disorders among children exposed to more than four ACEs (aOR 0.25; CI: 0.10-0.61).

Discussion

Our study found that exposure to four or more ACEs was associated with increased odds of current mental health outcomes; however, individual, family and community resilience moderated the effect of ACE exposure on the outcomes of interest. Among children with four or more ACEs, the presence of individual resilience decreased the odds of ADHD, behavior disorder, anxiety and depression and the presence of community resilience decreased the odds of depression. These results are consistent with prior literature showing that child resilience and parental engagement diminished the effect of ACEs on mental, emotional or behavioral conditions (C. Bethell et al., 2016).

These findings suggest that resilience is an important factor when examining ACE exposure and mental health outcomes and validate more narrowly focused studies (Fuller-Thomson & Lewis, 2015; Kerker et al., 2015). Researchers have demonstrated protective factors associated with positive adaptation to include having a sense of belonging, individual abilities and a protective community (Narayan et al., 2018).

Characteristics of resiliency measured in this study include curiosity and interest in learning new things, ability to stay calm and in control when faced with a challenge, completion of tasks, contentment with life and attachment with parent. Key components of resiliency similar to those described in this study as shown by the Devereaux Adults Resiliency Scale (DARS)

scale include self-efficacy, secure attachments to individuals to provide encouragement and emotional support, effective decision making, control of one's thoughts and the ability to appropriately express one's feelings (Mackrain, 2013). The Substance Abuse and Mental Health Services Administration mentions the following three prominent factors that contribute to childhood resilience: problem-solving skills, self-regulation and relationship with caring adults (SAMHSA, 2019). These qualities have been shown to contribute to resiliency in adulthood which is basically characterized by possessing meaning and engagement in life as well as positive relationships (C. D. Bethell et al., 2019). The promotion of such characteristics could strengthen the level of engagement and meaning that children possess within their relationships and activities in schools, homes and the environment.

Self-regulation and engaging children in problem solving activities is important for cognitive development, social and academic success and can play an important role in mental health outcomes (SAMHSA, 2019). Infants who can develop self-regulation as well as recognize and express their feelings are more able to control their behaviors as they become older and self-regulation has been shown to be associated with improved coping, stress management and resilience (Murray et al., 2016). These skills can be improved with mindfulness training and computer training programs (Traub & Boynton-Jarrett, 2017).

The findings from this study should not neglect the importance of the family and community resilience context as children should have access to a supportive environment to enable the decreased impact of ACEs on mental health outcomes. The foremost responsibility for the healthy growth and development of children lies with their families. Families are entrenched within communities and communities can enable or impede the abilities of families to provide for their children. The needs of families are different and family supports are determined

partially by the resources within the communities and the needs of the individual family. Special attention should be given to families at heightened risk for poor developmental outcomes. Informal sources of support such as relatives, neighbors, friends and religious organizations are relevant to families with children in addition to formal sources of support such as childcare services. The natural sources of support for families live within the context of the community and culture where families often support each other.

Sometimes, the adult relationships may not be protective; rather, they provide insufficient responses to the needs of child. The American Academy of Pediatrics (AAP) committee on the psychosocial aspects of family and child health described that in such situations, the activities that support the function of the family, positive parenting techniques and the social environment must then become available outside the home of the child (Rushton & Kraft, 2013).

Families that have young children develop a relationship with the children's health professional at an early stage compared to other formal supports (home visitors, social workers and early childhood educators). The frequency of contact between the family and health care providers of the children, however, also offers a platform for a variety of services focused on children and their families. Thus, for such reasons, family-centered medical homes offer an opportunity to create therapeutic associations with families, engage families and utilize developmental surveillance to monitor the progress of children's mental health. All these elements have been shown to be crucial to effective health promotion (Garg et al., 2013).

Indeed, the priority on providing support to children and their families is becoming a formal process incorporated into the outpatient family-centered medical home within the U.S. The National Committee on Quality Assurance (NCQA) is one of the leading supporters of the family-centered medical home and this organization has established standards which form the

basis for quality primary care (National Resource Center for Patient-Centered Medical Home, 2020). One of the standards instituted by the NCQA is that medical homes should assist links to resources in the community and track referrals to such resources (Leslie et al., 2016).

Integral to the development of the child is a discussion with the family, which highlights their own abilities, cares and resources. The genetic and health endowment of children affects their developmental abilities as well as a myriad of other familial factors such as domestic violence, parental mental illness, substance abuse and lack of social capital. Techniques that can be integrated into the health of children include better screening for social risks and development within the child's home, increased comprehensive anticipatory guidance and affirmative support for families as well as connecting child health care providers in a team fashion with similar professionals focused on child care services (Rushton & Kraft, 2013).

A nationwide health promotion curriculum administered by the AAP is known as Bright Futures which is the standard for health care prevention and promotion among children in the U.S (Hagan et al., 2017). Bright Futures emphasizes the health needs of children within the context of the family and the community. An extensive theme of Bright Futures is the requirement for clinicians to provide family support. Where applicable, child health providers need to assess several family strengths and challenges as they advance optimal development.

The Healthy Steps model is one of the most effective models of team-based care within the home visitation model. This evidence-based model places an early childhood development professional within the medical home of children to offer more comprehensive support of family development activities (Zuckerman et al., 2004). A study showed identification of behavioral concerns, receipt of suitable anticipatory guidance, improvements in discipline practices,

promotion of knowledge and receipt of care at the same location over time (Minkovitz et al., 2007).

Formal screening in children's health happens within the larger context of social and family history taking, interaction with families over time and establishing an interest on the lives of the families. The possibility for continual developmental surveillance and the evaluation of how the child is thriving over a period of time enables a trusting relationship between the family and the child health provider. This relationship can become a buffering influence against toxic stress and aid in the recognition of potential issues such as behavioral health, violence, poor social capital and socioeconomic distress (American Academy of Pediatrics, 2019).

Developmental screening is an important aspect of majority of children's health care regimen within the U.S, however, screening for psychosocial factors has been slowly integrated into office routines (C. D. Bethell et al., 2015). Formal screening offers an understanding of the strengths of families and obstacles that affect the developmental trajectory of children. A barrier in the execution of integrated health care is the absence of consensus regarding the content of environmental, social and mental health issues which should be examined (Rushton & Kraft, 2013). There is an unwillingness to screen and identify problems that child health care providers are ill-equipped to address. Therefore, altering screening methods necessitate modifications in the techniques that child health providers are trained in order to improve their capabilities to address new issues found through screening.

Limitations

This is a cross-sectional study due to the nature of the survey. Unfortunately, the U.S lacks a longitudinal population-based study that incorporates information on mental outcomes,

ACEs, resilience, and other variables evaluated here. Such information, including integration with costs of care, medical services and other environmental measures are necessary to report causal effects and improve understanding of variations in outcomes among risk subgroups. The follow-back surveys provided by the NSCH hold promise in the absence of a longitudinal study. Other limitations include the lack of comprehensiveness for the measures that were evaluated. Usually, surveys like the NSCH are subjective and influenced towards positive reporting, indicating that with improvement, the outcomes observed here possibly show greater effects of ACEs and resilience factors.

Conclusions

This study contributes to the growing literature showing the positive associations between resilience and improved mental health outcomes among children exposed to ACEs which fills a critical gap. These results are relevant to the development and implementation of evidence-based methods to further resilience and can be utilized by childcare professionals and policy makers to focus interventions to children at risk. Improving resiliency in children exposed to ACEs could help to mitigate the effect of ACEs and enable them to recover, thus supporting healthy and more productive lives. By enabling children restore and improve their sense of control, meaning and connections through characteristics described in this study, we can provide opportunities to thrive. This can help to reduce the effect of mental health problems on the life course and affect children at such a critical phase of development as they transition into adulthood.

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Table 4.1

Characteristics of Study Population in Total and by Current Mental Health Status Among Respondents to the 2018 NSCH

Characteristic		Current ADHD		Current Behavior Disorder		Current Anxiety		Current Depression	
	Total	Yes	No	Yes	No	Yes	No	Yes	No
	N [a](%)[b]	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Total Sample	26572	2677 (8.6)	23895 (91.4)	1901 (6.9)	24671 (93.1)	2719 (8.0)	23853 (92.0)	1198 (3.7)	25374 (96.3)
Individual Level									
Sex		***		***		**		*	
Male	13892 (51.1)	1845 (11.5)	12047 (88.5)	1340 (8.7)	12552 (91.3)	1277 (7.1)	12615 (92.9)	531 (3.1)	13361 (96.9)
Female	12680 (48.9)	832 (5.6)	11848 (94.4)	561 (5.0)	12119 (95.0)	1442 (9.0)	11238 (91.0)	667 (4.3)	12013 (95.7)
Race/Ethnicity		***		**		***		^	
Hispanic	3129 (25.6)	248 (6.4)	2881 (93.6)	221 (5.8)	2908 (94.2)	267 (5.9)	2862 (94.1)	121 (2.6)	3008 (97.4)
White, Non-Hispanic	18388 (49.9)	1981 (10.0)	16407 (90.0)	1281 (6.9)	17107 (93.1)	2086 (10.3)	16302(89.7)	884 (4.2)	17504 (95.8)
Black, Hispanic	1739 (13.8)	193 (9.7)	1546 (90.3)	175 (9.7)	1564 (90.3)	122 (5.6)	1617 (94.4)	80 (4.2)	1659 (95.8)
Other, Non-Hispanic	3316 (10.6)	255 (6.2)	3061 (93.8)	224 (5.7)	3092 (94.3)	244 (5.7)	3072 (94.3)	113 (3.1)	3203 (96.9)
Age		***		***		***		***	
3-5 years	4618 (19.3)	65 (1.4)	4553 (98.6)	205 (4.3)	4413 (95.7)	92 (2.1)	4526 (97.9)	8 (0.3)	4610 (99.7)
6-11 years	9367 (40.2)	1024 (9.8)	8343 (90.2)	863 (9.2)	8504 (90.8)	850 (7.6)	8517 (92.4)	187 (2.1)	9180 (97.9)
12-17 years	12587 (40.5)	1588 (10.9)	10999 (89.1)	833 (5.9)	11754 (94.1)	1777 (11.3)	10810 (88.7)	1003 (6.9)	11584 (93.1)
Insurance Status		***		***		*		***	
Public only	5333 (30.1)	754 (10.2)	4579 (89.8)	729 (10.5)	4604 (89.5)	714 (8.4)	4619 (91.6)	379 (5.1)	4954 (94.9)
Private only	18629 (57.1)	1577 (7.6)	17052 (92.4)	880 (4.5)	17749 (95.5)	1679 (7.5)	19650 (92.5)	661 (2.7)	17968 (97.3)
Public and private	1005 (3.9)	214 (15.8)	791 (84.2)	192 (14.5)	813 (85.5)	197 (13.8)	808 (86.2)	97 (8.8)	908 (91.2)
Uninsured	1605 (8.9)	132 (6.6)	1473 (93.4)	100 (6.5)	1505 (93.5)	129 (8.0)	1476 (92.0)	61 (2.8)	1544 (97.2)
Family Level									
Family Structure		***		***		^		***	
Non-Parent/ Other Relative	1594 (8.4)	263 (12.3)	1331 (87.7)	241 (11.9)	1353 (88.1)	205 (8.6)	1389 (91.4)	113 (5.1)	1481 (94.9)
Single Parent	5268 (22.8)	657 (10.1)	4611 (89.9)	545 (10.0)	4723 (90.0)	690 (9.8)	4578 (90.2)	349 (5.6)	4919 (94.4)
Two Parents Unmarried	1666(8.0)	178 (9.1)	1488 (91.0)	151 (8.2)	1515 (91.8)	174 (8.1)	1492 (91.9)	87 (4.3)	1579 (95.7)
Two Parents Married	18044 (60.7)	1579 (7.5)	16465 (92.5)	964 (4.8)	17080 (95.2)	1650 (7.3)	16394 (92.7)	649 (2.7)	17395 (97.3)

Household Educational Level						^			
< High school/ High school	4405 (29.8)	416 (7.5)	3989 (92.5)	416 (7.5)	3989 (92.5)	452 (6.8)	3953 (93.2)	236 (4.4)	4169 (95.6)
Some college or more	22167(70.2)	1485 (6.6)	20682 (93.4)	1485 (6.6)	20682 (93.4)	2267 (8.5)	19900 (91.5)	962 (3.4)	21205 (96.6)
Income/Poverty Level				***				*	
<100% FPL;	3156 (19.7)	366 (9.4)	2790 (90.6)	366 (9.4)	2790 (90.6)	379 (8.3)	2777 (91.7)	208 (5.1)	2948 (94.9)
100-199% FPL;	4366 (22.1)	423 (8.0)	3943 (92.0)	423 (8.0)	3943 (92.0)	495 (7.6)	3871 (92.4)	247 (4.2)	4119 (95.8)
200-399% FPL;	8129 (27.1)	534 (6.5)	7595 (93.5)	534 (6.5)	7595 (93.5)	807 (8.3)	7322 (91.7)	335 (2.8)	7794 (97.2)
≥ 400% FPL	10921 (31.1)	578 (4.8)	10343 (95.2)	578 (4.8)	10343 (95.2)	1038 (7.9)	9883 (92.1)	408 (3.2)	10513 (96.8)
Caregiver Mental Health		***		***		***		***	
Excellent, very good/good	24260 (88.3)	2280 (7.9)	21980 (92.1)	1519 (5.9)	22741 (94.1)	2332 (7.4)	21928 (92.6)	974 (3.0)	23286 (97.0)
Fair/poor	672 (2.9)	151 (23.2)	521 (76.8)	163 (25.1)	509 (74.9)	205 (28.8)	467 (71.2)	122 (18.3)	550 (81.7)
No response	1640 (8.8)	246 (11.1)	1394 (88.9)	219 (10.7)	1421 (89.3)	182 (7.9)	1458 (92.1)	102 (5.1)	1538 (94.9)
Community/Societal									
Opportunities for play/activity									
Yes	19965 (77.2)	1944 (8.5)	18021 (91.5)	1408 (6.8)	18557 (93.2)	2038 (7.9)	17927 (92.1)	869 (3.7)	19096 (96.3)
No	6607 (22.8)	733 (9.1)	5874 (90.9)	493 (7.1)	6114 (92.9)	681 (8.4)	5926 (91.6)	329 (3.7)	6278 (96.3)
Safe Neighborhood						^		*	
Agree	25207 (92.4)	2495 (8.5)	22712 (91.5)	1746 (6.7)	23461 (93.3)	2518 (7.8)	22689 (92.2)	1111 (3.4)	24096 (96.6)
Disagree	1365 (7.6)	182 (10.0)	1183 (90.0)	155 (9.0)	1210 (91.0)	201 (10.8)	1164 (89.2)	87 (6.5)	1278 (93.5)
Medical Home		*		***		***		***	
Yes	14165 (47.8)	1284 (7.6)	12881 (92.4)	736 (5.3)	13429 (94.7)	1192 (6.4)	12973 (93.6)	437 (2.3)	13728 (97.3)
No	12407 (52.2)	1393 (9.5)	11014 (90.5)	1165 (8.3)	11242 (91.7)	1527 (9.5)	10880 (90.5)	761 (4.6)	11646 (95.4)

^p≤ .05 *p ≤ .01 **p ≤ .001 ***p ≤ .0001 [a] Unweighted frequencies [b] Weighted percent

Table 4.2

Prevalence of Resiliency by ACEs Among Respondents to the 2018 NSCH

Characteristic	<4 ACEs		≥4 ACEs		
	Unweighted N	Weighted %	Unweighted N	Weighted %	P-value
Individual Resilience					
Low	6576	87.2	928	12.8	<0.0001
High	18102	93.7	966	6.3	
Family Resilience					
Low	4049	80.6	802	19.4	<0.0001
High	20629	94.5	1092	5.5	
Community Resilience					
Low	20713	90.9	1772	9.1	<0.0001
High	3965	97.1	122	2.9	

Table 4.3

Unadjusted and Adjusted Odd Ratios of Adverse Childhood Experiences (ACEs) and Resilience (Individual) Predicting Current Mental Health Outcomes

Characteristic	Current ADHD				Current Behavior Disorder				Current Anxiety				Current Depression			
	Model 1	Model 2	Model 3[a]	Model 4[b]	Model 1	Model 2	Model 3[a]	Model 4[b]	Model 1	Model 2	Model 3[a]	Model 4[b]	Model 1	Model 2	Model 3[a]	Model 4[b]
ACES	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)
Less than four ACEs	Referent		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent
Four or more ACEs	*** 2.76 (2.19-3.47)		*** 2.13 (1.68-2.71)	*** 2.23 (1.75-3.08)	*** 3.93 (3.08-5.02)		*** 3.00 (2.34-3.86)	*** 3.03 (2.35-4.20)	*** 3.31 (2.63-4.17)		*** 2.66 (2.09-3.38)	*** 2.74 (2.09-3.67)	*** 6.52 (4.91-8.67)		*** 5.23 (3.89-7.03)	*** 5.00 (3.57-7.00)
Individual Resilience																
Low		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent	Referent
High		*** 0.16 (0.14-0.19)	*** 0.17 (0.14-0.20)	*** 0.18 (0.15-0.21)		*** 0.09 (0.08-0.12)	*** 0.10 (0.08-0.13)	*** 0.10 (0.08-0.13)		*** 0.21 (0.18-0.25)	*** 0.22 (0.19-0.27)	*** 0.23 (0.19-0.27)		*** 0.18 (0.14-0.24)	*** 0.21 (0.16-0.28)	*** 0.20 (0.15-0.27)
ACEs*Resilience (Individual)				0.79 (0.76-0.82)				0.95 (0.81- 1.03)				0.91 (0.72-1.08)				1.17 (1.06-1.28)

[a] Adjusted odds ratio adjusted for ACEs and resilience [b] Interaction term included ***p ≤ .0001

Table 4.4

Unadjusted and Adjusted Odd Ratios of Adverse Childhood Experiences (ACEs) and Resilience (Family) Predicting Current Mental Health Outcomes

Characteristic	Current ADHD				Current Behavior Disorder				Current Anxiety				Current Depression			
	Model 1	Model 2	Model 3[a]	Model 4[b]	Model 1	Model 2	Model 3[a]	Model 4[b]	Model 1	Model 2	Model 3[a]	Model 4[b]	Model 1	Model 2	Model 3[a]	Model 4[b]
ACES	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)
Less than four ACEs	Referent		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent
Four or more ACEs	*** 2.76 (2.19-3.47)		*** 2.48 (1.96-3.16)	*** 1.95 (1.46-2.97)	*** 3.93 (3.08-5.02)		*** 3.32 (2.59-4.28)	*** 2.34 (1.56-3.48)	*** 3.31 (2.63-4.17)		*** 2.78 (2.17-3.55)	* 1.82 (1.26-2.62)	*** 6.52 (4.91-8.67)		*** 5.18 (3.71-7.23)	*** 2.50 (1.56-3.95)
Family Resilience																
Low		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent	Referent
High		*** 0.60 (0.50-0.72)	*** 0.70 (0.58-0.85)	*** 0.64 (0.52-0.78)		*** 0.45 (0.37-0.55)	*** 0.57 (0.46-0.69)	*** 0.48 (0.39-0.60)		*** 0.46 (0.39-0.55)	*** 0.55 (0.46-0.67)	*** 0.47 (0.38-0.57)		*** 0.33 (0.26-0.42)	*** 0.46 (0.34-0.63)	*** 0.29 (0.22-0.40)
ACEs* Resilience (Family)				1.55 (1.05-1.85)				* 1.92 (1.87-2.05)				* 2.19 (2.03-2.35)				*** 3.93 (3.77-4.09)

[a] Adjusted odds ratio adjusted for ACEs and resilience [b] Interaction term included *p ≤ .01 ***p ≤ .0001

Table 4.5

Unadjusted and Adjusted Odd Ratios of Adverse Childhood Experiences (ACEs) and Resilience (Community) Predicting Current Mental Health Outcomes

Characteristic	Current ADHD				Current Behavior Disorder				Current Anxiety				Current Depression			
	Model 1	Model 2	Model 3[a]	Model 4[b]	Model 1	Model 2	Model 3[a]	Model 4[b]	Model 1	Model 2	Model 3[a]	Model 4[b]	Model 1	Model 2	Model 3[a]	Model 4[b]
ACES	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)
Less than four ACEs	Referent		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent
Four or more ACEs	*** 2.76 (2.19-3.47)		*** 2.72 (2.16-3.43)	*** 2.64 (2.15-2.92)	*** 3.93 (3.08-5.02)		*** 3.80 (2.98-4.86)	*** 3.73 (2.95-4.86)	*** 3.31 (2.63-4.17)		*** 3.31 (2.63-4.17)	*** 3.27 (2.79-3.43)	*** 6.52 (4.91-8.67)		*** 6.31 (4.75-8.39)	*** 6.50 (4.85-8.70)
Community Resilience																
Low		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent	Referent		Referent	Referent	Referent
High		^ 0.76 (0.59-0.98)	0.83 (0.65-1.07)	0.80 (0.53-1.01)		* 0.53 (0.36-0.79)	^ 0.60 (0.41-0.89)	^ 0.57 (0.38-0.88)		0.89 (0.69-1.14)	0.99 (0.77-1.28)	0.98 (0.77-1.04)		** 0.50 (0.34-0.74)	^ 0.62 (0.42-0.93)	0.69 (0.45-1.05)
ACEs* Resilience (Community)				1.77 (1.53-1.93)				1.60 (1.47-1.69)				1.20 (1.09-1.47)				^ 0.36 (0.22-0.50)

[a] Adjusted odds ratio adjusted for ACEs and resilience [b] Interaction term included ^p≤ .05 *p ≤ .01 **p ≤ .001 ***p ≤ .0001

Table 4.6

Interactions of Adverse Childhood Experiences (ACEs) and Resilience Predicting Current Mental Health Outcomes

Independent Variables	Current ADHD	Current Behavior Disorder	Current Anxiety	Current Depression
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
ACEs*Resilience (Individual)				
≥4|Low	*Referent*	*Referent*	*Referent*	*Referent*
≥4|High	0.14 (0.08-0.23) ***	0.10 (0.06-0.16)***	0.21 (0.13-0.35)***	0.24 (0.13-0.43)***
ACEs*Resilience (Family)				
≥4|Low	*Referent*	*Referent*	*Referent*	*Referent*
≥4|High	0.99 (0.65-1.51)	0.93 (0.59-1.44)	1.02 (0.67-1.57)	1.16 (0.71-1.90)
ACEs*Resilience (Community)				
≥4|Low	*Referent*	*Referent*	*Referent*	*Referent*
≥4|High	1.41 (0.57-3.51)	0.92 (0.31-2.79)	1.18 (0.45-3.04)	0.25 (0.10-0.61)*

^p≤ .05 *p ≤ .01 **p ≤ .001 ***p ≤ .0001

Chapter 5. Discussion

Summary of Main Findings

This dissertation study incorporated three specific aims that were accomplished in three manuscripts. Prior to the development of the research manuscripts, extensive literature review was conducted to determine research gaps, which informed the research questions and study. The focus of the first aim was to determine the prevalence of currently diagnosed mental health outcomes among children between 3 and 17 years old and examine the relationship between sociodemographic factors and mental health outcomes utilizing the nationally representative NSCH data collected in 2018. The prevalence of current mental health disorders among children ranged from 3.7% for depression, 6.9% for behavioral disorders, 8.0% for anxiety disorders and 8.6% for ADHD. Significant variations were found for sociodemographic factors where the prevalence of mental health outcomes was higher for older age, Whites, public insurance, single-parent homes or homes without parents, caregivers with mental health problems and non-users of medical home. These findings confirm that ADHD, behavioral disorders, anxiety and depression remain common among children and augment what is known regarding the prevalence among children and adolescents as well as subpopulations where gaps. Collectively, the findings from this study provide baseline data that is critical to monitor trends and patterns.

The focus of the second aim of the dissertation study was to analyze the relationships between ACEs, resilience, and mental health outcomes. Children exposed to four or more ACEs had greater odds of all four mental health outcomes. The observed results were not attenuated even after controlling for key sociodemographic characteristics that vary among participants in the study. Thus, this suggests that exposure to ACEs can affect the mental health of children and

not just adults. Parental divorce or separation and economic hardship were the most prevalent types of ACEs. Individual, family and community categories of resilience were associated with reduced odds of mental health outcomes.

The goal of the third aim was to evaluate how individual, family and community resilience moderates the relationship between ACEs and mental health outcomes. The results showed that the inclusion of resilience to the model, particularly individual and family resilience, decreased the strength of the relationship between ACEs and mental health outcomes while the relationship between resilience and mental health outcomes remained the same. There were significant interactions between exposure to ACEs and child resilience for mental health outcomes and significant interactions between ACEs and community resilience for depression. Study findings included tables for the analyses conducted. These findings identify important resilience factors to improve the knowledge on why certain children who have experienced ACEs may not experience negative mental health outcomes and are able to persevere and thrive despite traumatic experiences.

This study has much strength while contributing to the current literature of mental health outcomes among individuals exposed to ACEs. The findings are highly generalizable with the exclusion of institutionalized children since the NSCH was designed to be nationally representative of noninstitutionalized children within the U.S. To our knowledge, the NSCH survey is the first population-based study among children to measure ADHD, behavioral disorders, anxiety, depression, ACEs and resiliency. Lastly, the use of interviews with caregivers or parents of children to evaluate outcome and exposure measures offers more timely information to build intervention efforts rather than retrospective interviews conducted during adulthood regarding childhood exposures.

Implications of Study Findings and Recommendations for Future Work

Males were more likely to exhibit externalizing mental disorders (ADHD and behavior disorders) and females were more likely to exhibit internalizing mental health disorders (anxiety and depression). Prior studies have shown that females were more likely than males to have anxiety and mood disorders but less likely to have substance abuse and behavioral disorders (Merikangas et al., 2010; Zahn-Waxler et al., 2008). Findings associated with the sex of a child and utilization of mental health services showed increased use and unmet need by males compared to females.(Ganz & Tendulkar, 2006).

Low socioeconomic status reduces the probability that mental health services will be initiated or maintained and children who live below the federal poverty line are three times more likely to report that they had unmet need for mental health services compared to children whose family income were more than 185% of the FPL (Ganz & Tendulkar, 2006).

Furthermore, the data highlighted significant associations between the mental disorders of children and their caregivers' mental health, which could be a results of shared biological and genetic predispositions, environmental factors and relationship between the parent and the child. The strong association between mental health disorders and parent/caregiver characteristics portray the relevance of the family context in the development of mental health disorders. Divorce has been shown to be associated with mental problems in children particularly, anxiety, behavior disorders and substance abuse (Shanahan et al., 2008). The mechanisms underlying the effect of non-intact families on mental health in children including biological vulnerability and the indirect impact on disruptions within the home environment necessitate further study.

Utilization of mental health services in children may be directly related to structural barriers associated with parent's views on mental health services and problems rather than the mental health of parents. Further research is needed to examine the utilization of mental health services, types of treatment, settings where services are received and related constraints or barriers and facilitating factors related to access and utilization of mental health treatment which impacts the diagnoses of these disorders.

Future iterations of the NSCH survey data can be utilized to continuously monitor the diagnosis patterns for the prevalence of these disorders. This information can aid clinicians to understand patterns in the frequency of the diagnoses of these disorders. Prospective research is also needed to comprehend the risk factors for the onset of mental health disorders in children and adolescents as well as the predictors for the continuance of these problems into adulthood.

The receipt of care in a medical home was shown to reduce the occurrence of mental health disorders. The identification of a primary care provider that enables access to a range of providers have been shown to reduce racial disparities in access to mental health care and increase preventive care (Rosenthal, 2008). Homer et al. showed that care coordination improved mental health outcomes (Homer et al., 2008). In a different study which was a randomized trial of children who had ADHD, the authors found that implementing coordinated care between medical care and mental health was linked to increased rates of mental health treatment inception and completion, improved behavioral outcomes of children and decreased parental stress (Kolko et al., 2014). The collaboration between mental health care providers and the receipt of needed referrals has also been shown to improve outcomes (Rosenthal, 2008).

Future studies should examine the association between each component or characteristic of the medical home and mental health outcomes. The findings from this study portray the need

for continued research on how to best optimize the efficacy of the medical home model to address ACEs, the social determinants of health and mental health outcomes.

Deprivation and threat have been regarded to relate differently with functioning and neurodevelopment. Therefore, experiences of deprivation such as economic hardship more often result in the development of internalizing disorders and experiences of threat such as violence more often result in the development of externalizing disorders, based on prominent neurodevelopmental effects (McLaughlin et al., 2014). However, in this study the prevalence of economic hardship for anxiety and behavior disorders were comparable while the prevalence of economic hardship for depression was lower than ADHD and behavior disorders. Also, the prevalence of neighborhood violence was higher for anxiety than ADHD and behavior disorders. This emphasizes the need to study these disorders individually. This distinction may enable future research to identify possible explanations for the different associations between ACEs and the mental health outcomes.

The findings demonstrate the need for more research and examination of the hypothesis regarding the prospective causal role that exposure to ACEs may play in the generation or exacerbation of mental health problems as well as in the risk for social or developmental delays in children.

These results raise questions for future examination on the mechanism by which resilience promote support for positive mental health. Future studies should examine each factor of resiliency by itself without being combined in a group/category to examine the individual potential of each factor. What is more revealing here is the impact of resilience measures to attenuate the effect of ACEs that have already occurred and the relationship between these measures regardless of ACE status. The attenuating impact of resilience shown here indicate the

importance of population-based advancement of these measures overall and especially for children who may have already been exposed to ACEs.

There is adequate evidence on the prevalence and crosscutting effect of ACEs as well as promising methods to prevent or ameliorate the negative effect of trauma during childhood to support efforts to promote necessary research on evaluating and addressing ACEs and to synthesize and convey current research into concrete practices and policies. In line with the call by Clyde Hertzman for a period of experimentation (Hertzman & Stefanowicz, 2013), the creation of a collaboratively endorsed research and policy plan designed to be sustaining is recommended so priorities and lessons obtained are updated and incorporated over time.

Integrating knowledge regarding ACEs and resilience into real-time evaluation and delivery of health care services may require routinely collected information from patients regarding ACEs and important health assets such as resilience in medical records. This would enable the integration of information reported by caregivers, patients and children with diagnostic and treatment information as well as portray important opportunities for furthering health and elucidate the impact of approaches to address ACEs on mental health.

Furthermore, it is important to note that screening for ACEs across the population and within clinical practice would necessitate further research to illustrate its unique value compared to current screening practices. The findings from this research support the utilization of ACE measures as a screening tool and emphasize the importance of assessing resilience in conjunction. This will maximize the development of personally tailored treatment that accounts for and creates additional resources that could mitigate the impact of ACEs.

Screening practices based on evidence of past or current traumatic events and the presence of chronic or toxic stress and not on specific ACEs such as violence could be useful. In other words, these screenings would be based on consequences rather than events. Because of the vast number of important ACEs that could be included within a screening tool and the anticipated different impact across developmental age groups among children, such screening practices may be important when the aims for screening are to recognize children experiencing trauma and target attempts to promote resilience and good health. When the goal is to specifically identify events, numerous events are best confirmed utilizing other validated screening methods. The Children with Special Health Care Needs (CSHCN) screener utilizes a consequence-based method which could be a pattern for screening for ACEs (C. D. Bethell et al., 2015).

Screenings for ACEs are not expected to substitute diagnostic screening methods for issues such as depression, post-traumatic stress disorder or sexual abuse. Instead, screening for ACEs may be useful to identify the subset of children with social determinants of bad health with mental health diagnoses that could benefit from integrated health care methods. Addressing sources of toxic stress and screening is a type of immunity against child abuse, which is a primary role of anticipatory guidance to families, provided by child health care professionals.

Developing the relationship between the child and the parent is an opportunity to advance optimal development and search for potential abuse or poor development. Providers of child health are in a position to monitor the quality of the relationship between the parent and the child and educate families, screen for adversity, reinforce strengths of parents and refer families as necessary to early intervention, quality childcare, home visiting services, Early Head Start and other resources to support the family. Also, it may be beneficial to consider the use of informal

and community services to provide the necessary care during childhood. These types of services may be more accessible to parents who perceive formal services as stigmatizing (Young & Rabiner, 2015) which is possibly the case in the underprivileged families and neighborhoods that these children grew up in.

Certain integrated care models that address health within the context of the social determinants such as ACEs and trauma-informed care models are arising. However, it is imperative to show and scale up such models to evaluate and address trauma. This is especially true of promising models associated with building child resilience, family dynamics and community environments. Trauma-informed efforts that include the recognition, understanding and response to links between the history of trauma and current problems are designed to target the prevention and decrease of impacts from ACEs. Such efforts are described, recommended and endorsed by the Centers for Medicare and Medicaid Services (CMS), American Academy of Pediatrics (AAP), Substance Abuse and Mental Health Administration (SAMHSA), and Administration for Children and Families (ACF) (C. Bethell et al., 2016). Although not as yet addressed by pediatricians, ACEs are a growing concern among pediatric providers who increasingly aim to advance resilience and the emotional and social wellbeing of children (Kerker et al., 2016).

Pediatric providers may gain from the results of this study as treatment and diagnosis for mental health outcomes among children are important to pediatric care. As demonstrated, mental health disorders are common among children and research implies that they can interfere with the normal functioning. Thus, it is imperative that pediatric health care providers screen for these disorders. In addition, it was found that many children may have limited access to mental health

specialists. Therefore, primary care providers represent the best hope for proper diagnosis and treatment among high-risk children.

Barriers to mental health services have been addressed through the published guidelines for adolescent depression in primary care to improve the identification of depression among children. The AAP recommends the utilization of standard anxiety tools to assess symptoms for diagnoses (Zuckerbrot et al., 2018). Although pediatric providers are relevant to diagnose mental health disorders, yearly visits also afford an opportunity to identify exposures to ACEs via screening tools. To bolster trauma-informed practices among pediatricians, the AAP has created the resilience project which offers clinical screening tools for ACEs (American Academy of Pediatrics, 2019). The initiative developed the trauma toolbox in coordination with the Maternal and Child Health Bureau designed to inform professionals about ACEs and the procedure for asking families regarding exposure to ACEs. The findings from this study indicate that screening for ACEs may be predictive of mental health outcomes among children and adolescents. The association between ACEs and mental health outcomes may indicate the probability of coordinated screening practices among pediatricians.

While ACEs can shape the health of an individual across the life course, the findings here suggest their negative impacts may appear through increased common mental conditions in childhood. The long-term impact of such conditions can be substantive. Illness in childhood and anti-social behavior affects school attendance and consequently, possibilities for educational attainment and improved economic prospects (Bellis et al., 2018). Trauma-informed care and integrated public services can provide support to prevent ACEs and possibly develop resilience assets that mitigate some of their negative consequences. Population-based ACEs surveys can

inform national policies and the uses of a combined measure of ACEs provide an underlying structure for multi-agency engagement.

However, individual level support for those exposed to or at risk of mental health outcomes need studies that directly assess the assess the acceptability and efficacy of interventions. Already, early social skills development and parental support have been shown to be associated with reduced risk of adverse mental health outcomes.

Recommendations of initiatives, policies and practice guidelines are included in the CDC's Essentials for Childhood initiative and the National Bright Futures Guidelines for Health Supervision of Infants, Children, and Adolescents to aid program and child service professionals to adopt effective methods to promote the type of resilience measures examined in this study (Hagan et al., 2017). Also, the Prioritizing Possibilities national agenda and the Health Outcomes of Positive Experiences framework both seek to promote evidence-based methods for the promotion of resilient measures in public health, clinical and human services settings. Examples of such methods have included targeted family prevention interventions and guidelines for pediatric practice (C. Bethell et al., 2016; Leslie et al., 2016; National Scientific Council on the Developing Child, 2015).

The National Council believes that it is not just sufficient to be trauma-informed organizations, but to be resilience-oriented at the individual, family, community and system levels (National Council for Behavioral Health, 2020) . The National Council has developed a standardized framework regarding best practices for screening and evaluating mental health, trauma and resilience as well as best practices for trauma-specific services, workforce development and community outreach.

The eradication of ACEs may be beyond the scope of many communities. However, investments in assets that develop resilience may counter some of the consequences disproportionately suffered by persons with ACEs and the findings here may be beneficial to those with low or no ACEs. Many of the community resilience factors examined in this study portray thriving communities. An asset-based community development approach aims to improve existing features within communities to enable residents control the challenges they may face. This approach to developing resilience would identify and invest in current features within localities that enable friendship networks, community roles models, cultural connectedness and access to community support (Bellis et al., 2018). The return on investments from such methods could be substantial in the short-term seen in the improvements of the child's well-being and through long-term benefits for the life course of the individual. Although services and public policy consider ways to support such developments, we should ensure these community features are not dismantled because they may inherently protect some of the most vulnerable children.

It has been stated that an improved understanding of socio-ecological resilience can attenuate the problems for individuals with increased ACE scores and aid to develop approaches that allow for increased precision in establishing the level of risk in persons with numerous ACEs (Narayan et al., 2018). Masten's framework of resilience and other ecological perspectives have considered the community as a main component of developmental adaptation or resilience (Masten & Tellegen, 2012). Thus, this study fills the gap by providing data on community resilience which has been limited or absent from prior research.

According to the social stratification theory, deprived communities lack social integration, have reduced informal social control and increased rates of crime (Ousey, 2000).

These circumstances may lead to mistrust and alienation of inhabitants of such communities from the society, which could elucidate variations in the norms and values, including deviant beliefs towards maltreatment, services such as childcare and police, mental illness and use of specialist mental health care.

The mismatch between the need and utilization of services is greater within deprived communities than in advantaged communities. To address this mismatch, the concept of the Building Community Resilience (BCR) model was introduced. This model examines the capacity issues of health care organizations, decrease fragmented delivery in healthcare and enable integrated systems of care across various partners (Ellis & Dietz, 2017). This model facilitates collaboration across organizations critical to influencing outcomes and building community resilience which include narratives from the community to provide assessment, understanding capabilities and identifying community resources and gaps in service. A community-based plan is carried out to prevent and decrease toxic stress and trauma in order to improve mental health and build capacities that impact resilience. In the long run, multi-problem children may benefit more from this approach rather than merely obtaining formal mental health care services during childhood.

The findings from this study highlight the importance of policies that improve insurance coverage to decrease socioeconomic barriers as well as the importance of improving relationships between mental health care providers and minorities to reduce stigma related to seeking mental health care for children and educating caregivers regarding the benefits of mental health care. Research aimed at developing the understanding of differences in mental health services utilization would help to inform policies targeted at decreasing barriers for each type of treatment.

Although many programs are being established with diverse individuals, few of these programs specifically describe cultural adaptations (Alegría et al., 2016). From a policy and practice point of view, tension exists between promoting quality mental health care and ensuring that care is feasible, equally effective and acceptable for minorities and low-income patients (Ramos & Alegría, 2014). The findings from this study have implications for providers. Providers should be culturally competent and aware of barriers that could delay seeking help for treatment. Addressing the concerns of families could decrease such barriers and ultimately result in reduced disparities in utilization of mental health services and better treatment retention. Developing an improved understanding of barriers in accessing treatment can help to reduce disparities in mental health outcomes.

Even with the use of limited set of ACE measures from the NSCH which does not include information regarding the scope, frequency and severity of these experiences on children, associations between ACEs and mental health are readily visible in childhood, which provides ample opportunity for the health care system to intervene and avert the long-term complications that have been demonstrated in adult-focused studies.

This study enriches the expanding literature about the social determinants of health, and the neurodevelopmental and intervention literature by showing at the population level, the role of ACEs in the healthy development of children in the U.S. As the nation seeks to develop the health care system and population health, attending to children and adolescents with or at risk of ACEs may produce immediate and long-term benefits which include health promotion and the reduced severity and impact of mental health conditions in children and in the adults they become in the future.

This study highlights the importance of resilience, because even though the burden of mental health might not be completely removed by such measures, the presence of resilience may reduce the severity of these disorders. Given the high prevalence of ACEs among children and adults and the potential benefits of resilience for all individuals, a public health population-based approach to comprehending ACEs and furthering resilience should be recommended, in addition to interventions for high-risk groups. The measurement of resilience factors and the role they play in reducing negative mental health outcomes among children with ACEs enables the improvement of endeavors to determine intervention and engagement initiatives.

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APPENDIX: Description of Study Variables and Questions

MENTAL HEALTH OUTCOMES

Name	Variable	Label	Original Values	Recoded Values
ADHD	ADHDind_18	Children who currently have ADD or ADHD, age 3-17 years	1 "Do not currently have condition" 2 "Ever told, but do not currently have condition" 3 "Currently have condition"	(0) "Does not currently have condition" (1) "Currently has condition"
Anxiety	anxiety_18	Children who currently have anxiety problems, age 3-17 years	1 "Do not currently have condition" 2 "Ever told, but do not currently have condition" 3 "Currently have condition"	(0) "Does not currently have condition" (1) "Currently has condition
Behavior Disorders	behavior_18	Children who currently have behavioral or conduct problems, age 3-17 years	1 "Do not currently have condition" 2 "Ever told, but do not currently have condition" 3 "Currently have condition"	(0) "Does not currently have condition" (1) “Currently has condition"
Depression	depress_18	"Children who currently have depression, age 3-17 years	1 "Do not currently have condition" 2 "Ever told, but do not currently have condition" 3 "Currently have condition"	(0) "Does not currently have condition" (1) "Currently has condition

COVARIATES

Name	Variable	Label	Original Values	Recoded Values
Individual level				
Sex	sex_18	Sex of Child	1 "Male" 2 "Female"	(0) "Male" (1) "Female"
Race/ Ethnicity	race4_18	Race and ethnicity of child, 4 categories	1 "Hispanic" 2 "White, non-Hispanic" 3 "Black, non-Hispanic" 4 "Other/Multi-racial, non-Hispanic"	(0) Hispanic (1) White, non-Hispanic (2) Black, non-Hispanic (3) "Other/Multi-racial, non-Hispanic"
Age				
3-5	SC_AGE_YEARS (if 3<= SC_AGE_YEARS <= 5)	Age of Selected Child - In Years		(0) 3-5
6-11	Age3_18 (use category 2)	Children's age in 3 categories	1 "0-5 years old" 2 "6-11 years old" 3 "12-17 years old".	(1) 6-11
12-17	Age3_18 (use category 3)	Children's age in 3 categories	1 "0-5 years old" 2 "6-11 years old" 3 "12-17 years old".	(2) 12-17
Insurance Status	InsType_18	Indicator 3.3: Type of health insurance at time of the survey	1 "Public health insurance only" 2 "Private health insurance only" 3 "Public and private insurance" 4 "Uninsured"	(0) "Uninsured" (1) "Public and private insurance" (2) "Private health insurance only" (3) "Public health insurance only"
Family Level				
Family Structure	famstruct5_18		1 "Two parents, currently married" 2 "Two parents, not currently married" 3 "Single parent (mother or	(0) Nonparent/ other relative (either grandparent/ other family type) (1) single parent (2) two parents unmarried

			father)" 4 "Grandparent household" 5 "Other family type"	(3) two parents married
Household Educational Level	AdultEduc_18	Highest level of education among reported adults	1 "Less than high school" 2 "High school or GED" 3 "Some college or technical school" 4 "College degree or higher"	(0) less than high school education (no GED) or high school diploma (GED); and (1) some college or college degree/ higher
Income/Poverty Level	povlev4_18	Poverty level of this household based on DHHS guidelines - Imputed	1 "0-99% FPL" 2 "100-199% FPL" 3 "200-399% FPL" 4 "400% FPL or greater".	(0) <100% FPL; (1) 100-199% FPL; (2) 200-399% FPL; (3) ≥ 400% FPL
Caregiver Mental Health	**Created new variable from below**	Father AND Mother (Parents)		(0) No response (1) fair/poor (2) excellent, very good/good
Father's mental health	FatherMH_18	Father's mental or emotional health status, children living with biological, adopted, step, or foster mother	1 "Excellent or very good" 2 "Good" 3 "Fair or poor" 95 "No father reported in the household as a primary caregiver of the child".	(0) No response (1) fair/poor (2) excellent, very good/good
Mother's mental health	MotherMH_18	Mother's mental or emotional health status, children living with biological, adopted, step, or foster mother	1 "Excellent or very good" 2 "Good" 3 "Fair or poor" 95 "No mother reported in the household as a primary caregiver of the child".	(0) No response (1) fair/poor (2) excellent, very good/good
Community/Societal				

Opportunities for play and physical activity (2 variables)*	park_18 OR RecCentr_18	"Children who live in neighborhoods with a park or playground area" OR "Children who live in neighborhoods with recreation center, community center or Boys'/Girls' Club	1 "Neighborhood contains a park or playground area" 2 "Neighborhood does not contain …." OR 1 "Neighborhood contains a recreation center, community center or Boys'/Girls' Club" 2 "Neighborhood does not contain …"	Either park_18 OR RecCentr_18= 2, then new variable =0 Either park_18 OR RecCentr_18= 1, then new variable =1
Safe Neighborhood	NbhdSafe_18	"Indicator 7.2: Children live in safe neighborhood"	1 "Definitely agree" 2 "Somewhat agree" 3 "Somewhat/ /Definitely disagree"	somewhat disagree or definitely disagree as disagree (0) and definitely agree or somewhat agree as agree (1)
Medical Home	MedHome_18	Indicator 4.12: Children who receive coordinated, ongoing, comprehensive care within a medical home	1 "Care MEETS medical home criteria" 2 "Care DOES NOT meet medical home criteria"	(0) "Care DOES NOT meet medical home criteria" (1) "Care MEETS medical home criteria"

ACES

Name	Variable	Label	Original Values	Recoded Values
ACE Group/Count	ACEct_18	"Number of adverse childhood experiences, of 9 asked about		<4 ACEs (0) and ≥4 ACEs (1)
Economic Hardship	ACEincome2_18 ACE1	Hard to cover the basics like food or housing, on your family's income	1 "Very often or somewhat often" 2 "Never or rarely" Never, Rarely, Somewhat often, Very often	(0) never or rarely/ did not experience this ACE; (1) somewhat often or very often / experienced this ACE
Divorce/ Separation	ACEdivorce_18	Parent / guardian divorced / separated	1 "Experienced the adverse childhood experience" 2 "Did not experience this adverse childhood experience"	(0) No (1) Yes
Death	ACEdeath_18	Parent / guardian died	1 "Experienced the adverse childhood experience" 2 "Did not experience this adverse childhood experience"	(0) No (1) Yes
Incarceration	ACEjail_18	Parent / guardian served time in jail	1 "Experienced the adverse childhood experience" 2 "Did not experience this adverse childhood experience"	(0) No (1) Yes
Domestic Violence	ACEdomviol_18	Parents physically abused	1 "Experienced the adverse childhood experience" 2 "Did not experience this adverse childhood experience"	(0) No (1) Yes
Neighborhood Violence	ACEneighviol_18	victim/witness of neighborhood violence	1 "Experienced the adverse childhood experience"	(0) No (1) Yes

			2 "Did not experience this adverse childhood experience"	
Mental Illness	ACEmhealth_18	Mentally ill, suicidal, depressed	1 "Experienced the adverse childhood experience" 2 "Did not experience this adverse childhood experience"	(0) No (1) Yes
Substance Abuse	ACEdrug_18	Alcohol/Drug	1 "Experienced the adverse childhood experience" 2 "Did not experience this adverse childhood experience"	(0) No (1) Yes
Discrimination	ACEdiscrim_18	Treated or judged unfairly due to race	1 "Experienced the adverse childhood experience" 2 "Did not experience this adverse childhood experience"	(0) No (1) Yes

RESILIENCE

Name	Variable	Label	Original Values	Recoded Values
RESILIENCE(Individuals <6 years)				
0-2	flrish0to5_18	Flourishing for young children, age 6 months-5 years	1 "Meets 0-2 flourishing items" (coded as 0) 2 "Meets 3 flourishing items" (coded as 1) 3 "Meets all 4 flourishing items" (coded as 2)	(0) Low (<4) (1) High (4)
3	flrish0to5_18			
4	flrish0to5_18			
RESILIENCE(Individuals 6-17)				
0-1	flrish6to17_18	Flourishing for children and adolescents, age 6-17 years	1 "Always/usually response to 0-1 items" (code as 0) 2 "Always/usually response to 2 items" (code as 1) 3 "Always/usually response to all 3 items" (code as 2)	(0) Low (0-2 items) (1) High (all 3 items
2	flrish6to17_18			
3	flrish6to17_18			
RESILIENCE(Individual Combined)	resil0to 17_18		flrish6to17_18 & flrish0to5_18	(0) Low (<3/4 items) (1) High (all 3/4 items
RESILIENCE(Family)				
0-1	FamResilience_18	"Indicator 6.12: Family resilience composite measure";	0 "All or most of the time to 0-1 items"	(0) Low (<4) (resilfam) (1) High (4)

			1 "All or most of the time to 2-3 items" 2 "All or most of the time to all 4 items (code as 2)	
2-3	FamResilience_18			
4	FamResilience_18			
RESILIENCE(Community)				
Participation in sports, clubs or organized activities* (3 variables)	sports_18 OR clubs_18 OR lessons_18 OR	"Participation in sports teams or sports lessons after school or on weekends, age 6-17 years"; OR "Participation in clubs or organizations after school or on weekends, age 6-17 years"; OR "Participation in any other organized activities or lessons, such as music, dance, language or other arts, age 6-17 years";	1 "Participated in activity" 2 "Did not participate	(0) No (1) Yes
Access to a trusted adult	mentor_18	"Indicator 5.9: Children have at least one adult mentor they can rely on for advice or guidance, age 6-17 years	1 "Yes" 2 "No"	(0) No (1) Yes

Supportive Neighborhood	NbhdSupp_18	Child lives in a supportive neighborhood	1 “Live in Supportive Neighborhood” 2 “Does not live in Supportive Neighborhood”	
0-1 items	**Created new groups ComRes_18**			(0) "Yes/Agree to 0-1 items” (1) "Yes/ Agree to 2 items" (2) "Yes/ Agree to all 3 items
2 items				
3 items				
Categories	**Recoded into 2 categories**			
High (3)	(resilcom)			(0) Low (<3) (1) High (3)
Low (<3)				

ACEs SURVEY QUESTIONS:

ACE Questions	Response Options
1. Since this child was born, how often has it been very hard to cover the basics, like food or housing, on your family's income	Never, Rarely, Somewhat often, Very often
To the best of your knowledge, has this child ever experienced any of the following	
2. Parent or guardian divorced or separated?	Yes, No
3. Parent or guardian died?	Yes, No
4. Parent or guardian served time in jail?	Yes, No
5. Saw or heard parents or adults slap, hit, kick punch one another in the home?	Yes, No
6. Was a victim of violence or witnessed violence in neighborhood	Yes, No
7. Lived with anyone who was mentally ill, suicidal, or severely depressed	Yes, No
8. Lived with anyone who had a problem with alcohol or drugs	Yes, No
9. Treated or judged unfairly because of his or her race or ethnic group	Yes, No

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