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**MODERATORS IN THE RELATIONSHIP BETWEEN CUMULATIVE
ADVERSE CHILDHOOD EXPERIENCES AND ANXIETY/DEPRESSION
AMONG U.S. ADOLESCENTS**

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Counselor Education

by

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ABSTRACT

Guided by the social-ecological risk and protective factors framework, the purpose of this study was to examine the moderating variables from the family and community systems in the associations between cumulative Adverse Childhood Experiences (ACEs) and anxiety/depression among U.S. adolescents. More specifically, this study first aimed to identify the relationships between cumulative ACEs and anxiety/depression among adolescents, and further examined the moderating roles of family resilience, parental aggravation, community activities, and neighborhood support, after controlling for sociodemographic characteristics, such as age, race/ethnicity, and highest parental education level. The researcher also investigated how sex impacts interactions of cumulative ACEs and moderators. The study sample was drawn from the National Survey of Children's Health 2018-2019 (NSCH 2018-2019), a nationally representative cross-sectional archival data collected by parents or caregivers of children/adolescents. Among a total of 59,963 respondents in the survey (ages 0-17), the sample was limited to 12-17 aged adolescents, resulting in the final analytic sample for this study was 23,242 after addressing missing values. Two different sets of hierarchical binary logistic regression models were separately implemented for anxiety and depression in order to identify distinctive impacts of predictive and moderating variables on those mental health conditions. For ad-hoc analyses, additional hierarchical binary logistic regression models were conducted for anxiety and depression by sex. Descriptive findings from Chi-square tests, independent t-tests, and bivariate correlation analyses suggested statistically significant relationships between research variables.

Results of hierarchical binary logistic regression models demonstrated that predictive variables in the models presented similarities and differences across anxiety and depression in terms of their statistical significance. Both sets of models revealed that cumulative ACEs were significantly associated with outcome variables (OR = 1.40 for anxiety; OR = 1.53 for depression). Among moderating variables, including family resilience, parental aggravation, community activities, and neighborhood support, parental aggravation and community activities significantly moderated the relationship between ACEs and both outcome variables, anxiety and depression. Three-way interactions, among ACEs, family resilience, and sex and ACEs, parental aggravation, and sex, were significant in the model predicting anxiety. In contrast, no three-way interaction term was statistically significant in the model for depression. Implications for practice, counselor training, and future investigation are discussed.

Keywords: adverse childhood experiences, adolescent, anxiety, depression, protective factors, sex

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~Winston Churchill

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Chapter 1

Introduction

Background

Adverse Childhood Experiences (ACEs) refer to potentially traumatic events that occur in childhood, including experiencing abuse, neglect, violence, and household dysfunction, such as incarceration, substance misuse, and severe mental health problem in the household (Brown et al., 2009; Felitti et al., 1998; Finkelhor et al., 2013). The scope of ACEs initially consisted of ten specific types of adversity ranging from childhood abuse and neglect to household dysfunction in a monumental ACE study by Felitti and colleagues (1998). Scholars have unceasingly developed the concept of ACEs, adding and modifying the inventory of ACEs. The expanded types of ACEs include racial discrimination, income hardship, parental death, victimization, and witnessing violence (Cronholm et al., 2015; Finkelhor et al., 2013; Turner et al., 2020; Wade et al., 2014).

ACEs are pervasive among the U.S. population, such that approximately 61% of adults surveyed across 25 states reported they had experienced at least one ACE, and approximately 1 in 6 said they had experienced four or more types of ACEs (Centers for Disease Control and Prevention [CDC], 2021). According to the Behavioral Risk Factor Surveillance System (BRFSS) ACE data that surveyed 214,157 adults across the nation, survey participants reported emotional abuse (34.4%), physical abuse (17.9%), and sexual abuse (11.6%). They also reported frequent household challenges, such as

intimate partner violence (17.5%), substance abuse (27.6%), mental illness (16.5%), parental separation or divorce (27.6%), and incarcerated household member (7.9%). ACEs are also common among adolescents, with the National Survey of Children's Health reported approximately 44% of 10-17 aged adolescents (11,437 cases out of 26,094) had experienced at least one type of ACE (Lee et al., 2020).

A number of researchers have conducted research studies about the broad impacts of ACEs on developmental outcomes across the lifespan, since the original ACE study by Felitti and colleagues (1998). It is well established that ACEs have potentially wide-ranging effects from physical and mental health to behavioral health among adolescent populations, including violence perpetration and victimization (Duke et al., 2010; Forster et al., 2017), physical illness (Flaherty et al., 2013), health-risk behaviors, such as substance use and delinquency (Garrido et al., 2018), and suicidal risk (Perez et al., 2016). Additionally, a large body of work has also found significant associations between ACEs and a number of challenges within the context of K-12 settings among adolescents, including chronic school absenteeism (Stemple et al., 2017), school dropout (Morrow & Villodas, 2018), poor school engagement (Robles et al., 2019), school-based victimization and perpetration (Forster et al., 2020), and a lower degree of academic performance in school (e.g., Bethell et al., 2014). ACEs can have adverse, lasting effects on mental health among adolescents, increasing risks of anxiety and depression (Balistreri, 2016; Kim et al., 2020; Lee et al., 2020; Porche et al., 2016). Due to the ACEs' pervasiveness and extensive, adverse consequences, including anxiety and depression, it is critical to address the negative impacts of ACEs for school-aged adolescents through prevention and intervention efforts.

Anxiety and depression among adolescents are critical to examine carefully as two major outcomes of ACEs, because adolescence is a period of vulnerability for both mental health conditions (Hankin et al., 1998; Lijster et al., 2017; McLaughlin et al., 2015). Anxiety and depression are prevalent among adolescents. Costello and colleagues (2003) reported that up to 20% of adolescents experience anxiety or depression by age 18, and another recent study by Kim and colleagues (2021) demonstrated from a cross-sectional national survey that approximately 15% of 12-17 aged adolescents had anxiety, depression, or both. Adolescent anxiety and depression may lead to a broad range of subsequent consequences across the life-course in adulthood, including psychosocial outcomes (Essau et al., 2014), risk of recurrent episodes (Copeland et al., 2009), suicidality (Fombonne et al., 2001), and elevated risk of later psychopathology (Georgiades et al., 2006). Although there is a strong relationship and overlaps between adolescent anxiety and depression, they also show distinctive patterns in areas such as prevalence, onset age, developmental trajectories, and gender distributions (McLaughlin et al., 2015). The distinction between anxiety and depression is also demonstrated in outcome variables associated with ACEs, such that cumulative ACEs is more predictive for depression than anxiety among adolescents (Kim et al., 2021).

Scholars have previously documented the intergenerational continuities of ACEs and subsequent impacts on life opportunities and child's health outcomes, including mental and behavioral health consequences (Cooke et al., 2019; Dennis et al., 2019; Haynes et al., 2020; Lê-Scherban et al., 2018; Madigan et al., 2017; Metzler et al., 2021; Sun et al., 2017). For example, Metzler and colleagues (2017) suggested based on a

nationally representative sample that early adversity reverberates across generations, limiting life opportunities, such as education, employment, and income level, for those who have experienced ACEs. A study by Haynes and colleagues (2020) found in a large-scale survey that children's risk of anxiety and depression increased when their caregivers had multiple ACEs. Researchers also documented that mothers' ACEs confer an intergenerational risk to their children's social and emotional development (Sun et al., 2017), physical conditions and social functioning (Dennis et al., 2019), and internalizing and externalizing problems via maternal attachment avoidance (Cooke et al., 2019). These findings of the intergenerational influences of parent ACEs on child health may imply systemic inequities putting adolescents of parents who had past ACE exposure at higher risk of adverse health outcomes, which may lead to an unceasing chain of risk across generations.

Researchers have recently shown increased interest in investigating protective factors from individual and social systems that could buffer the ACEs' harmful effects and therefore support prevention and intervention efforts. For example, resilience as an individual characteristic has been reported to serve as a protective factor against the adverse impacts of ACEs and childhood traumas on various consequences, such as anxiety, depression, self-harm behavior, and suicidal risks (Clements-Nolle & Waddington, 2019; Ding et al., 2017; Philippe et al., 2011; Roy et al., 2011). Scholars found other individual assets, including social competency, positive identity, emotional regulation, and meaning making, also showed buffering effects for the impacts of childhood adversity and trauma (Banyard et al., 2017; Chatterjee et al., 2018). Supportive social environments, such as social support (Roh et al., 2015), family

resilience (Oshri et al., 2015), family functioning (e.g., Balisteri & Alvira-Hammond, 2016; Moore & Ramirez, 2016), and child's community engagement (Lu & Xiao, 2019), were also found to buffer the impacts of ACEs on various adverse consequences. These findings signify that it is critical to integrate social resources and environments, such as family and community systems, in preventing and addressing the adverse impacts of ACEs. Literature about protective factors for youth further suggests that family- and community levels factors, for example, family resilience (e.g., Oshri et al., 2015), parental aggravation (Suh & Luthar, 2020), neighborhood support (e.g., Prince et al., 2019), and community activities (Oosterhoff et al., 2017), may serve as protective factors against adverse impacts of ACEs.

ACEs and protective factors against ACEs' impact can be conceptualized in light of a social-ecological risk/protective factor framework. Researchers have recognized the importance of integrating the social-ecological framework into the assessment of risk and protective factors, along with individual-level factors, for building prevention and intervention programs, policies, and community capacity to support youth (Bogenschneider, 1996; Estrada et al., 2018; Hong & Garbarino, 2012; Yeh et al., 2014). The social-ecological model views human development as result of a process of mutual interactions between an individual and his or her immediate environmental contexts (Bronfenbrenner, 1979; 2005) and the social-ecological risk and protective factors framework presumes that individuals can be engaged with multiple risk and protective factors from each social and ecological system (Estrada et al., 2018; Ungar et al., 2013). The contexts that have immediate contact with adolescents typically include family and community as well as school (Haines et al., 2015; Novilla et al., 2006). Adolescents are

therefore exposed to various risk factors, such as ACEs, that increase the likelihood of negative outcomes, but they may also be situated to experience protective factors in each system that buffer against the impacts of such risks.

Sex as an individual-level characteristic has consistently emerged as a significant correlate of ACEs' prevalence, impacts, and the way protective factors work against the impacts of ACEs (Balistreri, 2015; Chatterjee et al., 2018; Merrick et al., 2018; Schilling et al., 2007). Girls, for example, were reported more vulnerable to the impact of ACE exposure on overall well-being outcomes for both children (ages 6-11) and adolescents (ages 12-17) (Balistreri, 2015), while other studies reported no sex difference for adults (Mersky et al., 2013; Lee & Chen, 201). Despite few studies that investigated sex differences in protective roles against the ACEs' impacts, one study by Chatterjee and colleagues found out that sex difference in the protective role of internal assets in the relationship between ACEs and early initiation of marijuana/alcohol, such that they served as protective factors only for female adolescents. Taken together, adolescences' responses to ACEs may vary depending on their individual characteristics, such as sex, and social and ecological systems, such as family and community systems.

Statement of the Problem

There is a growing interest among counselors and counselor educators in promoting understanding of the effects of ACEs on varied client outcomes and the importance of taking an ACEs-informed approach across various settings, from school and clinical mental health counseling to neuro-counseling (Navalta et al., 2018; Wheeler

et al., 2021; Zyromski et al., 2020). It is now well established that ACEs are related to lifelong negative consequences in mental health and further create an intergenerational impact placing children whose parents have ACEs at greater risk of health outcomes from and reducing life opportunities, including education, employment, and income, to those who have multiple ACEs (Cooke et al., 2019; Dennis et al., 2019; Haynes et al., 2020; Lê-Scherban et al., 2018; Madigan et al., 2017; Metzler et al., 2021; Sun et al., 2017). An accumulating body of research explores protective factors against the harmful effects of ACEs on mental health concerns, but less is known about protective factors against the impact of ACEs on the development of anxiety and depression for adolescent populations.

Despite a few research studies that investigated buffering factors against ACEs, several important research gaps still exist in exploring protective factors against the impacts of ACEs on anxiety and depression, which are two primary negative mental health outcomes of ACEs. Previous studies that examined potential protective factors in the relationship between ACEs and mental health outcomes mostly targeted adult populations, calling for further investigation for adolescent populations (Scully et al., 2019). Previous studies have also not paid attention to the comparison of anxiety and depression regarding protective factors. Existing studies focused on either depression only (e.g., Brinker & Cheruvu, 2017; Cheong et al., 2017) or a combined construct such as emotional well-being (e.g., Balistreri & Alvira-Hammond, 2016) as outcome variables. Those studies, however, have not paid attention to potential differences in the functions of moderators for each anxiety and depression symptom, leaving a question about whether moderating variables work differently in relation to anxiety and depression and

the cumulative impact of ACEs among adolescent populations. Few studies simultaneously considered individual-, family- and, community-level factors comprehensively in the analyses, although each level is deemed critical in understanding youth mental health from an ecological perspective (Haines et al., 2015; Novilla et al., 2006).

Very few studies considered multiple ecological systems comprehensively throughout the individual, family, and community levels. Prior work has not provided complete information about how individual characteristics interact with the way protective factors function in preventing anxiety and depression influenced by ACEs. Sex, among the individual characteristics, is a prominent sociodemographic factor with particular influence. Much of what is known about the role of sex is based upon its role in creating differences in the prevalence, impacts, and trajectories of ACEs. Literature has shown that sex plays a critical role in the prevalence of ACEs (Merrick et al., 2017; Schilling et al., 2007) and the impacts of ACEs on adverse health outcomes (Balistreri & Alvira-Hammond, 2016; Lee & Chen, 2017). A study by Chatterjee and colleagues (2018) focused on the sex difference in the buffering role of internal assets against the effects of ACEs. Despite a handful of extant works that focused on sex, less is known about how sex interacts with ACEs and moderating variables in ecological systems, such as family and community, in contributing to or preventing adolescents' anxiety and depression. The significant role of sex in the ACEs literature suggests a further need to explore how sex contributes to the complex interplay, as an additional moderator, among individual, family, and community factors in explaining the impacts of cumulative ACEs on adolescent anxiety and depression.

Purpose of the Study

Informed by the social-ecological risk and protective factors framework, the purpose of this study was to examine the moderating variables in the relationships between cumulative ACEs and anxiety/depression among adolescents in the U.S. for controlling sociodemographic characteristics from a sample of the 2018-2019 NSCH dataset. The current study further investigate how the protective factors serve differently depending on adolescent sex. The independent variable was defined as a cumulative index of ACEs (sum score of nine types of ACEs). The dependent variables comprised two binary items (yes or no), representing whether an adolescent currently has anxiety and depression, respectively. The moderating variables include family factors, such as family resilience and parental aggravation, and community factors, such as community activities, neighborhood support, and sex. Sociodemographic characteristics controlled in this study were age, race/ethnicity, and highest parental education level. Research questions of this study include:

Research question 1. What is the relationship between cumulative ACEs and anxiety/depression of adolescents in the U.S., after controlling predisposing factors (age, race, and highest parental education)?

Research question 2. How do moderating variables (family resilience, parental aggravation, community activities, and neighborhood support) impact the relationship of cumulative ACEs and anxiety/depression of adolescents in the U.S., after controlling predisposing factors?

Research question 3. Does sex impact the two-way interaction effects of cumulative ACEs and moderating variables (family resilience, parental aggravation, community activities, and neighborhood support) on anxiety/depression of adolescents in the U.S., after controlling predisposing factors, moderating variables, and two-way interactions?

Figure 1-1 shows conceptual model of the current investigation.

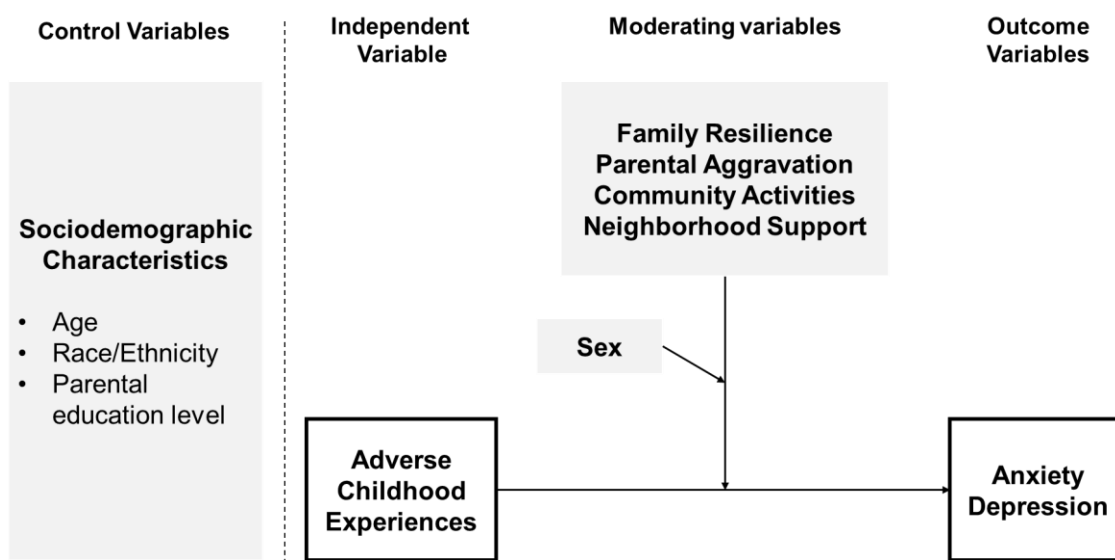


Figure 1-1: Conceptual Model of the Current Study

Significance of the Study

This study examined the selected moderating variables, including family resilience, parental aggravation, community activities, neighborhood support, and sex, in the association of cumulative ACEs and adolescent anxiety/depression. The current study further aimed to investigate whether sex impacts the two-way interaction effects of

cumulative ACEs and aforementioned moderating variables from the family and community settings. This investigation was expected to help understand how ecological systems surrounding the adolescents, such as family and community, could buffer the negative impacts of accumulated ACEs on the development of anxiety and depression. The study was also designed to advance knowledge of whether sex moderates the protective factors from family and community settings. The results provide professional counselors will gain advanced knowledge of how protective factors work differently depending on sex, which will be useful to develop preventive interventions for adolescents who had experienced multiple childhood adversities. Counselor educators also benefit from responding to the charge to provide training that addresses ACEs.

Definitions of Terms

Adolescence

Adolescence is an evolving construct informed through physiologic, psychological, social, and cultural lenses (Curtis, 2015). It is understood as a developmental period that conventionally include the years between the onset of puberty and the establishment of social independence (Steinberg, 2014).

Adolescents

There is an inconsistency in the inclusion criteria of adolescents, but the most commonly used chronologic definition for adolescents includes the ages of approximately

10-18. For example, the World Health Organization (2021) defines adolescents as individuals in the 10-19 years age group. In terms of counseling and psychotherapy, adolescent counseling is widely accepted as addressing mental health and behavioral concerns of teenagers ages 12-17. Accordingly, adolescents' age was limited between 12 and 17 years old in the current quantitative investigation.

Adverse Childhood Experiences (ACEs)

ACEs refer to potentially traumatic events that can occur during childhood.

ACEs may include any experience of abuse, neglect, violence, and household dysfunction (Felitti et al., 1998; Finkelhor et al., 2013). In this study, I used the ACE inventory of the 2018-2019 National Survey of Children's Health, which includes nine types of ACEs: (1) "difficulty getting by on family's income/basics like food or housing" (*income hardship*); (2) "parent or guardian divorced or separated" (*divorce*); (3) "parent or guardian died" (*parental death*); (4) "parent or guardian served time in jail" (*jail*); (5) "saw or heard parent or adults slap, hit, kick, punch one another in the home" (*domestic violence*); (6) "victim/witness of neighborhood violence" (*neighborhood violence*); (7) "lived with anyone who was mentally ill, suicidal, or severely depressed" (*mental health*); (8) "lived with anyone who had a problem with alcohol or drugs" (*drug*); and (9) "the child was treated or judged unfairly because of his/her race or ethnic group" (*discrimination*).

Risk and Protective Factors

Risk factors refer to “characteristics at the biological, psychological, family, community, or cultural level that precede and are associated with a higher likelihood of negative outcomes,” and protective factors refer to “characteristics associated with a lower likelihood of negative outcomes or that reduce a risk factor’s impact (Substance Abuse and Mental Health Services Administration [SAMHSA], 2019, p. 1). The risk and protective factors are posited in multiple domains and contexts, such as relationship, family, and community. These two-sided factors are known to be interrelated and have a cumulative effect on developmental outcomes (SAMHSA, 2019).

Sex

‘Sex’ refers to the biological aspects of maleness or femaleness, differentiated from ‘sex’ which implies psychological, behavioral, social, and cultural aspects of being male or female (American Psychological Association, 2015). In this study, adolescent sex was identified with a single item asking, “What is this child’s sex?” with binary response options (i.e., male and female).

Anxiety

Anxiety as a clinical term is persistent feeling of anxious involving more than temporary worry or fear (National Institute of Mental Health [NIMH], 2021). Anxiety symptoms can interfere with everyday activities for adolescents, such as schoolwork and

relationships. Adolescent anxiety in this study was identified based on caregiver's response to the single-item question "Has a doctor or other health care provider ever told you that this child has anxiety?"

Depression

Depression is a common and serious mood disorder that is characterized a sad mood lasting for a long time and interfering with daily functioning (CDC, 2021a). Depression involves various symptoms, including feeling sad and irritable, not wanting to do activities that used to be fun, eating more or less than usual, having difficulty in regular sleep, or feeling tired. Adolescent depression in this study was identified based on caregiver's response to the single-item question "Has a doctor or other health care provider ever told you that this child has depression?"

Chapter 2

Literature Review

Theoretical Framework

The current study adopted the Social-Ecological Risk and Protective Factors Model, which emphasizes the importance of risk and protective factors contributing to the development of adverse outcomes, anchored with the social-ecological model. Given the complex interplay among individual, the family, the community, and the social conditions that the individual is situated, the socio-ecological model provides a good conceptual framework to guide prevention and intervention efforts (Oral et al., 2016). The Social-Ecological Risk and Protective Factors Model provides a conceptual framework for how ACEs and protective factors interact and comprise particular development trajectories of adolescents' mental health conditions. The beginning part of this section first introduces the Social-Ecological Model by Bronfenbrenner (1979; 2005), and then describes risk and protective factors of adolescents' mental health, with ACEs as risk factors.

Social-Ecological Model

The social-ecological model was first initiated by Bronfenbrenner's (1979; 2005) ecological systems theory to explain human development as interactions between an individual and frequently experienced aspects of their environment across time. The ecological system theory looks at human development within the context of the

interactions of the different systems. Bronfenbrenner (1994) also acknowledged the importance of integrating biological factors, putting emphasis on complex reciprocal interactions among biopsychological human organism and immediate external environment. The ecological systems theory suggests that development of mental health concerns could be originated from the complex, interrelated systems that shape individual – which include microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Bronfenbrenner, 1994). This perspective corresponds with studies that have consistently found that youth's mental health is involved with adverse childhood experiences in their family, peer group, school, and neighborhood/community.

Bronfenbrenner's understanding of ecological systems comprised multi-layered systems surrounding an individual. The microsystem is the closest environment for a child, and it contains the structure with which the child has direct contact (Berk, 2006). The microsystem encompasses the relationships and interactions surrounding a child's immediate structures. The structures in the microsystem include family, school, neighborhood, and childcare systems. Paquette and Ryan (2001) insisted that the relations at this level between a child and a structure can happen in a bidirectional way: from the child and toward the child. For example, a child can be influenced by his or her parents in terms of cognition, behavior, and emotion, but the child also can influence the parents.

The mesosystem refers to interrelations among two or more microsystems containing the developing person. Paquette and Ryan (2001) described the mesosystem that this layer produces the connections between the microsystems surrounding a child or adolescent. For example, the interactions may include between home and neighborhood,

home and peers, and parents, and teachers. Kazak, Segal-Andrews, and Johnson (1995) have applied the Bronfenbrenner's ecological system to the chronically ill child. The researchers regarded mesosystem as interactions between caregivers and medical settings as well as health-care professionals.

The exosystem is an environment in which the person does not have immediate interactions or direct involvement. The exosystem can affect a child or adolescent indirectly throughout the microsystem. Examples include caregivers' workplace, extended neighborhood, community agencies, and relationship between parents (Hosek et al., 2008). The exosystem for a child or adolescent primarily involves a consideration of the parents' or caregivers' social networks.

The macrosystem was the final ecological system identified by Bronfenbrenner (1979). The macrosystem refers to the broader societal, cultural, political, and economic grounds that influence interactions throughout other layers and eventually affect the child's development. Examples of the macrosystem include larger societal structures and values (e.g., social, cultural, political, legal, religious) that can directly affect an individual child or adolescent as proximate child care and service system by laws or policies, or as a society as a whole (Hosek et al., 2008).

Bronfenbrenner (1986) added the chronosystem as the final layer surrounding the child. The chronosystem involves the influence of environmental changes on an individual's development over time. The chronosystem involves normative (e.g., marriage, puberty) and non-normative (e.g., death, divorce, chronic illness) transitions that can occur across the lifespan. The development of mental health disorders among adolescents can also be explained by accumulated stress from their ecologies rather than

a single event. Figure 2-1 provides the substructures of the social-ecological systems model.

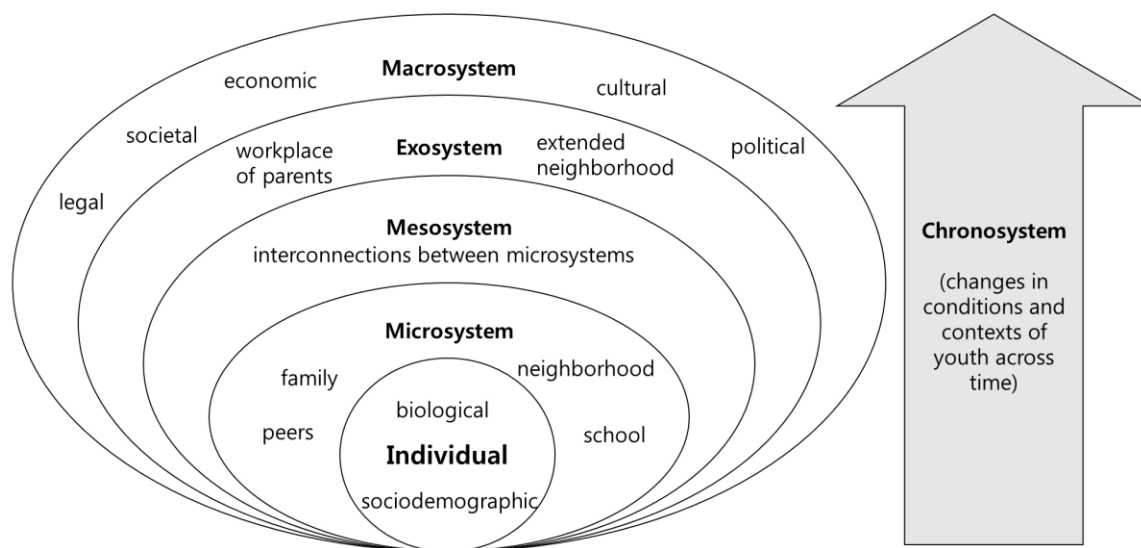


Figure 2-1: Representation of Bronfenbrenner's Ecological Systems Theory

The Centers for Disease Control and Prevention [CDC] (2021b) recapitalized the social-ecological model with a four-level system as a way of prevention of negative developmental outcomes: individual, relationship, community, and societal. The individual-level primarily includes personal characteristics, such as sex, age, and biological factors. The relationship-level refers to the interaction between two or more people, especially with peers and family members. The community-level involves settings or institutions in which social relationships take place. The societal level means societal factors, specifically health, educational, economic, and social policies, that can affect an individual's development. Figure 2-2 presents the CDC's conception of the social-ecological model.

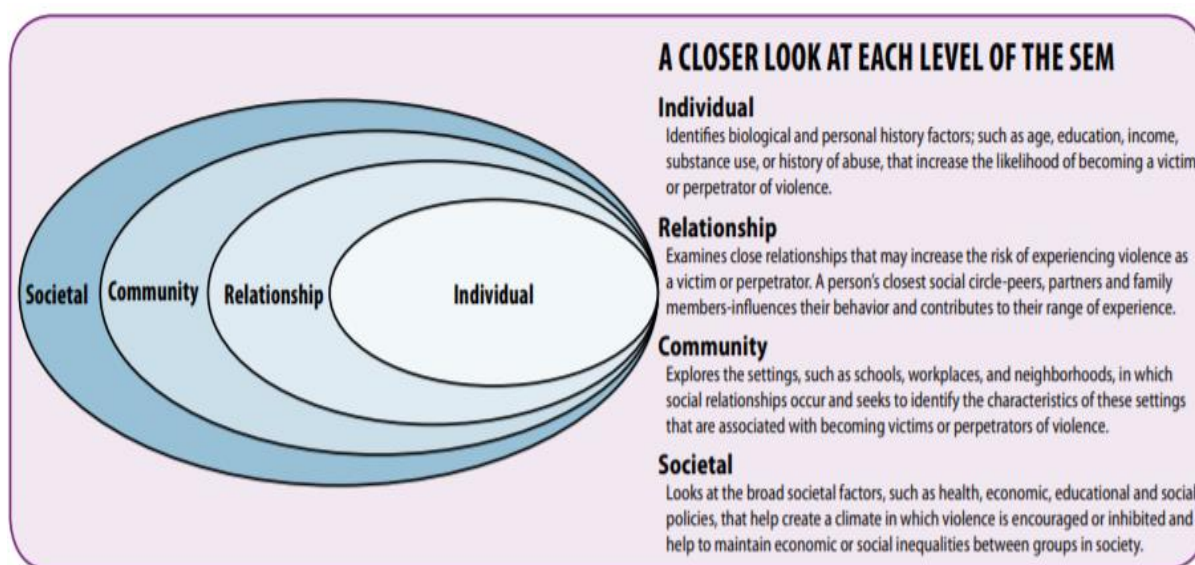


Figure 2-2: CDC's Conceptualization of the Social-Ecological Model

Social-Ecological Risk and Protective Factors Model

Researchers have endeavored to examine risk and protective factors in adolescents' development in multiple contexts, conceptualizing it as the social-ecological risk and protective factor approach (e.g., Estrada et al., 2018; Olson & Goddard, 2010; Yeh et al., 2014). Risk factors are individual and environmental characteristics at the biological, psychological, family, community, or cultural levels that are associated with a higher likelihood of negative developmental outcomes. Protective factors refer to characteristics associated with a lower likelihood of problem outcomes that can reduce risk factors' impacts on negative consequences. The term 'protective factor' has also been used to refer to interactive factors that prevent the adverse effects of a risk factor on an adverse outcome (Luthar, 2003).

Substance Abuse and Mental Health Services Administration (SAMHSA) recapitulated several critical features of risk and protective factors (SAMHSA, 2019). First, risk and protective factors exist in multiple layers. For example, risk factors and protective factors co-exist and operate within each of the different contexts, such as family, community, and society. Second, risk and protective factors are correlated and cumulative. People with risk factors are less likely to experience protective factors, and both risk and protective factors have a cumulative effect on the development. Third, individual factors can be associated with multiple outcomes. Risk and protective factors commonly can be associated with multiple consequences, impacting on physical, behavioral, social, and mental health conditions. Fourth, risk and protective factors are influential over time. For example, adverse events during childhood can contribute to the development of mental disorders later in life, commonly in adolescence or adulthood. Protective factors also can interact with the risk factors over time, mediating the effects of those adverse childhood experiences. These perspectives have emphasized that the most proximal influences, such as family, friends, school, and community with direct contacts, may have the most significant effects on developmental outcomes (e.g., Brookmeyer et al., 2006; Kidd et al., 2006). Table 2-1 and Figure 2-3 presents the social-ecological risk and protective factors framework for adolescents' mental health.

Table 2-1: Social-Ecological Risk and Protective Factors Framework for Adolescents' Mental health

Domain	Risk Factors	Protective Factors
Individual	Individual's biological and sociodemographic characteristics, such as sex, age, race/ethnicity, socioeconomic status, can interact with risk and protective factors	

Family	<ul style="list-style-type: none"> Psychological abuse Physical abuse Sexual abuse Psychological neglect Physical neglect Incarceration of a family member Mental illness of a family member Parental divorce or separation Income hardship of a household Domestic violence Frequent family conflict Parenting stress/aggravation 	<ul style="list-style-type: none"> Social & emotional support from family members Positive parenting Family resilience Family functioning
School	<ul style="list-style-type: none"> Poor academic performance Peer victimization Having no good friends 	<ul style="list-style-type: none"> Peer support Teacher support Mental health care service School climate
Community	<ul style="list-style-type: none"> Exposure to community violence Violence victimization Living in unsafe neighborhood and community 	<ul style="list-style-type: none"> Community service or volunteer Out-of-school activities (e.g., sports, clubs) Neighborhood support Neighborhood safety Mental health care service

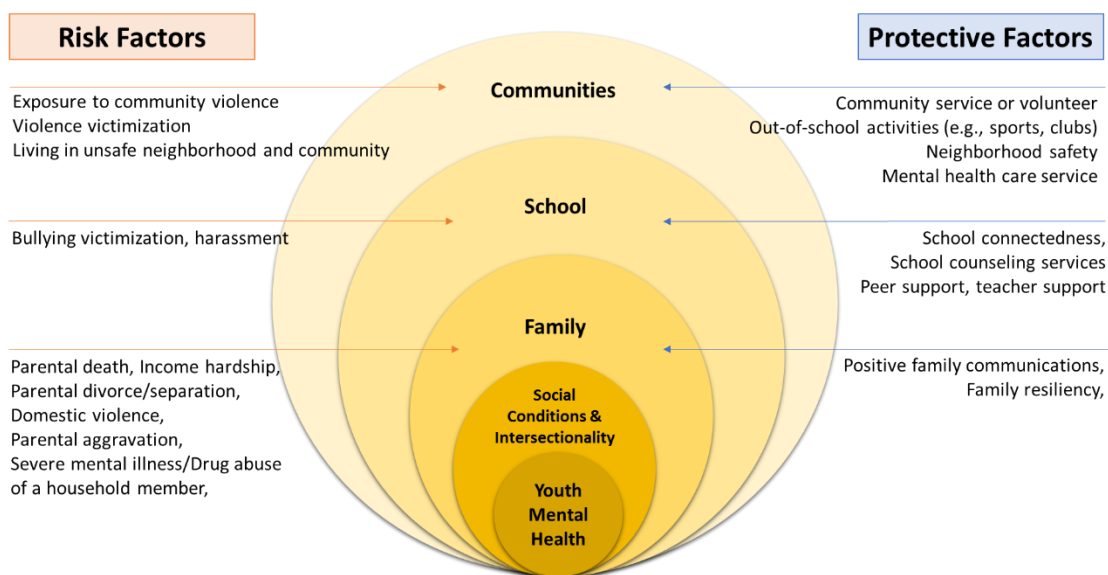


Figure 2-3: Social-Ecological Risk and Protective Factors Framework for Adolescents' Mental health

Conclusion of Theoretical Framework

The combined perspectives of social-ecological model and risk and protective model framework can best explain the linkage between childhood adversity and anxiety/depression in adolescence, given childhood adversities are regarded as life challenges that reinforce stress. Human development is the product of ongoing, reciprocal interactions among an individual and environmental context throughout the life course. Each layer of the ecological systems involves both risk factors (e.g., adverse childhood experiences, parental aggravation) and protective factors (e.g., family resilience, community activities, neighborhood support).

The Social-Ecological Risk and Protective Factors Model suggest that interactions between risk and protective factors can occur even at the same system (e.g., within individual characteristics, within a family, or within a community). This viewpoint provides a new angle with the social-ecological model, whose mesosystem posits interaction between two or more different microsystems (e.g., home-school, home-community, family-neighborhood). Many of adverse childhood experiences are nested around one's family, but at the same time, protective factors in the family can still function mitigating the impacts of ACEs. For example, when a child has a household member who have a severe mental health disorder, there can be a big disparity at a result depending on whether the child will experience positive family process addressing the problem confronted, or not. For another example, when a child was victimized from community violence living in an unsafe neighborhood environment, the consequence

could be differentiated contingent on whether the child would benefit from organized activities in the community that the child has a sense of trust and safety.

Individual characteristics also can be considered along with protective factors in the relationship between ACEs and the development of anxiety and depression in adolescence when integrating the social-ecological model into the combined conceptual model. A conceptual framework about the development of mental health problems among adolescents involves individual characteristics (e.g., predisposing biological conditions, sociodemographic characteristics), risk factors (e.g., ACEs, parental aggravation) and protective factors (e.g., family resilience, community activities, neighborhood support) from multiple systems (Bogenschneider, 1996; Olson & Goddard, 2010; SAMHSA, 2019). This framework will allow us to get a more thorough conceptualization of the developmental trajectories of individual adolescents who have a history of ACEs. Sex is expected to render significant interactions with risk and protective factors in the link from ACEs to adolescents' anxiety and depression, given the existing literature on ACEs that evidenced a significant role of sex. Table 2-2 describes how the research variables in the current study correspond with the Social-Ecological Risk and Protective Factors Model.

Table 2-2: Research Variables Corresponding to the Theoretical Framework

Domain	Risk Factors	Protective Factors
Intersectional identity and social conditions	<ul style="list-style-type: none"> • Sex (MV) • Age (CV) • Race/ethnicity (CV) • Parental education (CV) 	

Family	<ul style="list-style-type: none"> • Income hardship of the household (IV) • Divorce (IV) • Parental death (IV) • Incarceration of parent or guardian (IV) • Witnessed domestic violence (IV) • Severe mental health problem of a household member (IV) • Alcohol/drug problem of a household member (IV) • Parental aggravation (MV) 	<ul style="list-style-type: none"> • Family resilience (MV)
School	No school variable was included for this study.	
Community	<ul style="list-style-type: none"> • Victim/witness of neighborhood violence (IV) • Racial discrimination (IV) 	<ul style="list-style-type: none"> • Organized community activities (MV) • Neighborhood support (MV)

Note: IV=independent variable; MV=moderating variable; CV=covariates

Review of the Study Variables

Adverse Childhood Experiences

Adverse Childhood Experiences [ACEs] refer to stressful or traumatic events exposed during childhood (Brown et al., 2009; Felitti et al., 1998). Since Felitti et al. (1998) devised the ACEs inventory for the first time to measure adversities during childhood, an extensive body of research has evinced its impacts on broad aspects of human development. Researchers have reported that ACEs have associations with physical health, such as early mortality (e.g., Bellis et al., 2015; Kelly-Irving et al., 2013), cancer (e.g., Brown et al., 2013; Brown et al., 2010), and high-risk health behavior, such

as smoking (e.g., Edwards et al., 2007), alcohol abuse (e.g., Campbell et al., 2016; Dube et al., 2006), and risky sexual behaviors (e.g., Ramiro et al., 2010).

ACEs have been found to affect involvement in violence, such as violence perpetration and victimization (e.g., Duke et al., 2010; Forster et al., 2017; Reisen et al., 2019), sex offense (e.g., Levenson et al., 2016), and juvenile offense (e.g., Baglivio et al., 2015; Fox et al., 2015). An extensive body of work has found significant associations between ACEs and a number of challenges within the context of K-12 settings among adolescents. Such challenges include emotional dysregulation (e.g., Bradley et al., 2011), externalized behavior problems (e.g., Hazen et al., 2009), and a lower degree of academic performance in school (e.g., Bethell et al., 2014).

A large body of prior research has examined mental health difficulties, specifically adolescents' emotional and behavioral disorders, associated with multiple childhood adversities. These challenges as consequences of ACEs include depression (e.g., Balistreri & Alvira-Hammond, 2016; Brockie et al., 2015), anxiety (e.g., Spence et al., 2002), comorbid anxiety and depression (e.g., Hovens et al., 2010) and suicidal risk (e.g., Perez et al., 2016). Because of these extensive negative consequences of ACEs on health and behavior outcomes among adolescents, ACEs have received considerable amount of attention for the last few decades since the seminal Adverse Childhood Experience study in 1998 (Felitti et al., 1998).

Conventional ACE Study

The Adverse Childhood Experience (ACE) study by Felitti and colleagues (1998) has been recognized as the pivotal study of the ACEs literature from many researchers. The ACE study recruited participants through the Kaiser Permanente's San Diego Health Appraisal Clinic, one of the largest medical evaluation centers in the nation. A total of 13,494 Kaiser Health Plan members who completed standardized medical evaluations at the Health Appraisal Clinic between August–November of 1995 and January–March of 1996 were eligible to participate in the study.

The authors categorized ACEs into two dimensions: (a) abuse and (b) household dysfunction. They used three categories of childhood abuse, which included psychological (2 questions), physical (2 questions), and sexual abuse (4 questions). Categories of household dysfunction included substance abuse (2 questions), mental illness of a household member (2 questions), violent treatment of mother or stepmother (4 questions), and criminal behavior (i.e., incarceration of a household member; 1 question). The researchers use the seven categories in a total of childhood experience to assess abuse and household dysfunction. Respondents were considered being exposed to the specific adverse experience when they responded “yes” to at least one item in that category. They created a cumulative index by summing the scores of each category, which could range from 0 (unexposed to any category) to 7 (exposed to all categories).

Results of the ACE study found a strong dose-response relationship that more adverse childhood experiences were significantly associated with the presence of adult diseases, such as heart disease, cancer, chronic lung disease, and liver disease. The

researchers concluded adverse childhood experiences ultimately result in early death, through social, emotional, and cognitive impairment, adoption of health-risk behaviors, illness, disability, and social problems throughout the lifespan of an individual.

Expanded Types of ACEs

Many researchers have increasingly recognized the importance of broadening the conventional items of ACEs to capture a more comprehensive picture of the risks of childhood adversity (Finkelhor et al., 2013; Mersky et al., 2013). A variety of ACE measures have been developed with modifications and adaptations from the original ACE inventory, including new types of adversities, such as community violence, victimization, racial discrimination and poverty (e.g., Cronholm et al., 2015; Finkelhor et al., 2013; Wade et al., 2014). This expansion of the conventional ACE items is expected to strengthen the predictive power for adverse consequences and to contribute to a more comprehensive understanding of the patterns and effects of childhood adversity (Giovannelli, 2019). There have been growing attention to the expanded types of ACEs that investigators have been discussing and developing along with the conventional ACE items.

A series of research put more emphasis on the *exposure to violence and victimization in the community* as part of the ACE inventory. Evidence to date shows that the prevalence of witnessing community violence in urban youth ranged from 47% to 96% (Gorman-Smith et al., 2004). Children who are exposed to community violence showed significantly worse outcomes than SES-matched counterparts who were not

exposed (Graham-Bermann & Seng, 2005). Based on these results, some investigators had added exposure and victimization of community violence to the ACE inventory. For example, Finkelhor and colleagues (2013) endeavored to improve upon the list of ACEs by exploring a broad range of items to correlate with mental health symptoms. They tested a variety of adversities and finalized the revised inventory with a few additional items, such as ‘peer victimization’ and ‘exposure to community violence.’ Cronholm et al. (2015) also included witnessing violence to the ACE inventory.

Another body of research suggested specific types of family environment as the component of ACEs. *Foster care* is often classified as significant childhood adversity (Cronholm et al., 2015) because it usually represents a disruption to an attachment relationship. Growing up in a foster care system has been recognized as having unique challenges differentiated from parental separation/divorce, and it may be even more impactful than parental separation or divorce. *Family financial problems* also have been selected as an additional type of ACEs. For example, the National Survey of Children Health data included ‘income hardship’ in the ACEs inventory in their survey. Finkelhor and colleagues (2013) also incorporated low socioeconomic status (SES) into the ACEs inventory. Beyond the expanded types of ACEs above, other types of childhood adversities have been discussed, such as relational isolation (e.g., having no good friends, Finkelhor et al., 2013), racial discrimination (e.g., NSCH data), and frequent family conflict (e.g., parents always arguing, Finkelhor et al., 2013).

A recent study by Turner and colleagues (2020) provided a list of 40 types of ACEs under 11 different conceptual domains and compared predictive power for traumatic symptoms in childhood across those ACEs. They categorized the 11 domains

of ACEs with the following: family instability (e.g., divorced/separated, moved homes a lot), interpersonal loss (e.g., someone close died or very ill), family disorder (e.g., family member diagnosed with psychiatric disorders), non-relational threat (e.g., natural disaster, personal accident), economic stressors (e.g., parental job loss, low income), child maltreatment (e.g., physical abuse, emotional abuse), community violence exposure (e.g., witness weapon assault, school threat), property crime (e.g., robbery, vandalism), physical assault (e.g., weapon assault, bias assault), sexual victimization (e.g., sexual harassment, sexual assault), and peer victimization (e.g., physical intimidation, emotional bullying). Out of 40 ACEs, the researchers concluded that 15 types of ACEs - including physical abuse, emotional abuse, sexual assault, witnessed domestic violence, weapon assault, peer assault with injury, serious assault threat, bias attack, sexual harassment, peer physical intimidation, peer emotional abuse, witness attack with weapon, witness shots/bombs/riots, someone close illness, and someone close suicide attempt - were the most prominent predictors of traumatic symptoms for 10-17 aged adolescents.

Population-Based Survey of ACEs in the U.S.

Several nationally representative surveys have been implemented in the country, reflecting the needs to promote an understanding of ACEs and mitigate the ACEs-driven problem outcomes. The Behavioral Risk Factor Surveillance System (BRFSS) is a nationally representative health-related survey that collects data from noninstitutionalized adults. The BRFSS collects state data from U.S. residents about their health-related risk behaviors, chronic health conditions, and the utility of preventive services. The data

collection of the BRFSS initiated data collection in 1984 with 15 states and now in all 50 states and the District of Columbia and three U.S. territories. The BRFSS comprises three components: core modules (i.e., consistently administered items in all states), optional modules (Centers for Disease Control and Prevention-developed items that each state can optionally adopt), and state-added questionnaire (i.e., state-customized items). ACE items were included as an optional module from 2009 through 2012 and as state-added questions thereafter. The ACE module consists of eleven questions adapted from the ACE Study that cover eight types of ACEs: physical abuse, emotional abuse, sexual abuse, household mental illness, household substance use, incarcerated household member, parental separation or divorce, and household domestic violence.

The LONGSCAN (LONGitudinal Studies of Child Abuse and Neglect) is a consortium of five study sites that aims to investigate the antecedents and consequences of child maltreatment (Runyan et al., 1998). The study sites composed of disparate geographical regions and populations with different levels of risk for child maltreatment. One site included children that were at high risk for maltreatment, two sites included children who had been reported for maltreatment, and the other two sites included both children who had been reported as maltreated and children who were identified as at risk. All study sites recruited child-caregiver dyads from the family with 4-6 aged children. Items of ACEs comprised four categories of maltreatment (i.e., psychological maltreatment, physical abuse, sexual abuse, and neglect) and four categories of household dysfunction (i.e., caregiver's substance use/alcohol abuse, caregiver's depressive symptoms, caregiver being treated violently, and criminal behavior in a household).

The Fragile Families and Child Wellbeing Study (FFCWS) is another secondary longitudinal data which implemented a birth cohort study of 4,898 children born in low-income families between 1998 and 2000. This study used a stratified random sample of 20 large U.S. cities with more than 200,000 people and then sampled hospitals within cities and births within hospitals. The families of this data were interviewed soon after their child's birth and again when the child was about 1, 3, 5, 9, and 15 years old. The ACE items were drawn from the mother's 5-year follow-up interview by having mothers recall information about past adversities. In this survey, eight types of ACEs were assessed: physical abuse, emotional abuse, sexual abuse, neglect, parental domestic violence, parental mental illness, parental substance use, and parental incarceration. Parental divorce or separation was not included because FFCWS sampled non-marital families by its design. The FFCWS assessed global child neglect, differentiated from the original ACE inventory that could tell emotional neglect from physical neglect.

The National Survey of Children's Health (NSCH) is a random-digit, large cross-sectional, nationally representative survey designed and sponsored by the U.S Maternal and Child Health Bureau in partnership with the National Center for Health Statistics, Child and Adolescent Health Measurement Initiative, and a National Technical Expert Panel. The respondents of the NSCH data are parents or caregivers of children and youth who are 0-17 years old, across the 50 states and the District of Columbia. Questionnaires rendered children and youths' demographics, physical/mental/developmental problems, well-being, parental health, school-related factors, and neighborhood-related factors. The NSCH data has ten ACEs items, including income hardship, divorce or separation, death of a caregiver, incarceration of a caregiver, witnessing domestic violence,

victimization/witnessing of community violence, mental health problem of a household member, drug use of a household member, and racial discrimination.

Research has acknowledged several limitations of the NSCH data, such as parent or guardian report and cross-sectional design (Balistreti, 2015; Lee et al., 2020; Porche et al., 2016). The ACE items of the NSCH data used a modified version, instead of the conventional inventory of the ACE study by Felitti and colleagues (1998), which may require readers to be cautious when it comes to interpretation. Despite these limitations that may involve bias or limit the generalizability or interpretation for a causal relationship, the NSCH has its unique strengths. The NSCH is the only national sample of adolescents in the U.S. that researchers can examine ACEs with wide range of variables representing the family and community that the adolescent belongs. This wide-ranging aspect of the survey enables investigators to incorporate the interactions between risk (i.e., ACEs) and protective factors in family and community, along with various behavioral and mental health indicators. The NSCH data, for this reason, can be the most appropriate data when aiming to comprehensively consider the impacts of ACEs and protective factors in ecological systems surrounding individual adolescents.

Analytic Approaches to ACEs

There is not yet a consensus about the best way of analyzing ACEs in the literature (Stemple et al., 2017). Scholars have adopted different approaches in analyzing ACEs. The different analytical approaches to ACEs can be categorized into three

methods: the investigation of independent impacts, use of a cumulative index, and pattern-based approach.

Most of the investigations adopted a way of investigating the independent impacts of childhood adversities on developmental outcomes before the Felitti's (1998) ACE study appeared. Those prior work predominantly examined the independent impacts of individual childhood adversity by selecting a single or a few childhood adversities. For example, a study that used the data from the US National Comorbidity Survey (NCS; Kessler et al. 1994) included twenty-six childhood adversities in associations with psychiatric disorders. The authors of the study only examined the associations of independent adversities, instead of summing the number of adversities.

Felitti and colleagues' ACE study (1998) prompted sweeping changes to the approaches of ACE research, making the use of a summed score of ACEs common way of examining the impacts of ACEs. The use of the sum score has been used as a variable-centered approach that aims to explain the relationship between independent and dependent variables. Examples of the variable-centered approach include correlation, factor analysis, regression, ANOVA, and structural equation modeling. The variable-centered approach in the ACE research (i.e., use of the cumulative index) has strengths: simplicity of research design, convenience of analysis modeling, and efficiency of interpretation. These strengths enabled researchers to bring attention not only to other researchers and practitioners in relevant fields but also to the public because of the simplicity. For example, the findings produced by the use of cumulative index were advantageous to make impacts because the results described were delivered directly and immediately. For example, the results could be described efficiently, such that those with

an ACE score of 4 or more were twice as likely to be smokers, twelve times more likely to have attempted suicide, seven times more likely to be alcoholic, and ten times more likely to have injected street drugs compared with those with an ACE score of 0 (Van Niel et al., 2014).

Some researchers recently pointed out the limitations of using a cumulative index on the grounds that it fails to provide specificity and heterogeneity of adversities (e.g., Barboza, 2018). Several recent studies adopted a pattern-based or person-centered approach (e.g., latent class analysis) to address the limitation (Barboza, 2018; Lanier, Maguire-Jack, Lombardi et al., 2018; Lee et al., 2020; Stemple et al., 2017; Wolff et al., 2018). The purpose of the pattern-based approach is to determine if unique subgroups of similar characteristics exist (Howard & Hoffman, 2018). For example, Lee and colleagues (2020) identified unique subpopulations from the at-risk youth population who experienced at least one ACE: Multiple High-Risk, Multiple Low-Risk, Broken Family, and Income hardship. A person-centered approach has strength in providing information about the specificity of multiple ACEs, while it may be more challenging to interpret the results as each subgroup results in differences in outcome (Howard & Hoffman, 2018).

There are few published studies that implemented more than one approach simultaneously. One study reported research findings following three different analytic methods above simultaneously, including individual ACEs, summed ACE score, and latent classes of ACEs (Stemple et al., 2017). A logistic regression model predicting chronic absenteeism of youth was conducted with the products of three approaches as independent variables (i.e., independent ACEs, summed ACE score, latent class membership). This study found that particular ACEs were more likely to have a greater

effect on school absenteeism than others by examining not only the effects of sum score but also individual effects and latent classes of ACEs.

ACEs, Anxiety, and Depression among Adolescents

Anxiety and Depression among Adolescents

Anxiety disorders are known as the most common mental health problems experienced by adolescents (Costello et al., 2005). As children move into adolescence, specific types of anxiety disorders become more prevalent, with both sexes at higher risks of agoraphobia and obsessive-compulsive disorder and with girls more likely to experience social phobia (Costello et al., 2003; Ford et al., 2003). Anxiety disorder has been found to significantly impact on individuals' cognition, interpersonal and social functioning, and physical health (Teubert & Piquart, 2011). Anxiety disorders in adolescents are a greater associated with negative and adverse psychosocial outcomes in their adulthood, as compared to the anxiety disorders in childhoods (Essau et al., 2014).

The number of individuals with depression exceeded 300 million as of 2015, which was 4.4% of the entire population throughout the world (Walker et al., 2015). The prevalence of depression has been reported to be even greater in adolescents (Mojtabai et al., 2016; Saluja et al., 2004). In particular, Mojtabai et al. (2016) investigated national trends in major depressive episodes between 2005 and 2014, thus revealing that the prevalence of major depressive episodes in adolescents significantly increased from 8.7% to 11.3%, which is larger than the increase in young adults. It may be considered a

serious problem because the impacts of depressive symptoms on adolescents are devastating. Adolescents who have suffered from depressive symptoms are affected in schooling, educational attainment, and interpersonal relationships, which would lead them to have negative long-term consequences, even in adulthood (Lewinsohn et al., 1998).

ACEs and Anxiety/Depression

Anxiety and depression are complex mental health conditions, and a variety of risk factors and causal pathways are involved in the development of anxiety and depression. Stressful life events, or ACEs, are known as prominent risk factors along with a family history of mental health concerns and other parental factors (Maughan et al., 2013; Waite et al., 2014). Previous research established a robust relationship between ACEs and anxiety and depression from diverse settings and populations (e.g., Anda et al., 2006; Merrick et al., 2017; Mersky et al., 2013; Raposo et al., 2014). A recent systematic review and meta-analysis about the effect of multiple ACEs drew a conclusion that exposure to multiple ACEs is a major risk of many mental health conditions, especially anxiety and depression (Hughes et al., 2017).

Substantial works targeted children and adolescents in investigating the links between ACEs and later anxiety and depression as potential mental health outcomes. Children and adolescents aged 12 to 17 with multiple ACEs were found to have a significantly lower level of a composite score of emotional well-being, primarily consisting of depression and anxiety (Balistreri & Alvira-Hammond, 2016). Prevalence

of emotional, behavioral, and mental condition problems was higher in those experienced ACEs compared to those with no ACEs among 2-17 aged US children (Bethell et al., 2016). ACEs also were consistently reported to predict anxiety and depression from diverse and specific adolescent populations, for example, male adolescent offenders (Bielas et al., 2016) and female juvenile offenders in Japan (Matsuura et al., 2013).

Protective Factors against ACEs

Individual Level

Researchers have examined individual-level factors as potential protective factors from the impacts of multiple ACEs. Individual-level protective factors can include personal characteristics, traits, and internal resources and strategies related to resilience, such as personality traits, self-efficacy, coping, appraisal of maltreatment (Larkin et al., 2018). Resilience as an individual characteristic has been reported to be a prominent protective factor at the individual level. For example, internal resilience measured by 25 items of Connor-Davidson Resilience Scale (CD-RISC) among 13-17 aged juvenile offenders was found to prevent psychological distress associated with ACEs (Clements-Nolle & Waddington, 2019). Previous research has established that resilience plays a protective role from childhood trauma to anxiety (e.g., Philippe et al., 2011), depressive symptoms (Ding et al., 2017), self-harm behavior (Philippe et al., 2011), and suicidal risks (e.g., Roy et al., 2011) over various populations. A review article that analyzed protective factors associated with resilience at the individual, familial and societal levels

among a people with a history of child maltreatment concluded that the protective factors related to resilience decreased risks of negative consequences from ACEs (Men et al., 2017).

Chatterjee and colleagues (2018) highlighted internal assets as potential moderating variables in the relationship between ACEs and early initiation of marijuana and alcohol use among 9th-11th graders. They found that internal qualities, such as social competency and positive identity, moderated associations between ACEs and early initiation of marijuana and alcohol use only for girls, not for boys. Banyard and colleagues (2017) identified several individual protective factors on health outcomes among 12 years old and older individuals. They found emotion regulation, meaning-making, and practicing forgiveness predict better physical health among those with ACEs and trauma histories. Pan and colleagues (2019) reported that higher positive attributes, such as positive characteristics (e.g., responsible, humored, and lively) and adaptive social behaviors (e.g., polite, kind, and helpful), predicted lower psychotic experience for adolescents who have a history of childhood trauma.

Relational Level

A series of recent research found that social support can play a role as a protective factor buffering the impacts of ACEs on mental health with adults. A study identified social support as a potential protective factor that can reduce the burden of depression in older populations with ACE exposure for those who ages 50-69 adults (Cheng et al., 2017). Roh and colleagues (2015) reported that perceived social support bolster

resilience against harmful influences of ACEs on depressive symptoms for American Indian older adults over 50 years old. Brinker and Cheruvu (2017) used the 2010 BRFSS data, one of the largest health-related nationally representative data in the U.S. and highlighted social and emotional support as protective factors against depression in adults with ACE exposure. Folger and Wright (2013) found that social support from family and friends was related to a reduction in depression/anxiety symptoms and anger/hostility among college students with a history of child maltreatment. Results of a study by Brown and Shillington (2017) showed that stable relationships with parents and other adults moderated the association between ACEs and substance use for 11-17 aged adolescents. Similarly, having parents who can talk about things that matter or share ideas with the child appeared to be the strongest protective factor in the relationship between multiple ACEs and adverse school outcomes, such as low school engagement and repeating any grades (Robles et al., 2019).

Family Level

Evidence in the literature shows that positive family process and functioning serve as protective factors against mental health problems for individuals with ACEs. A review that examined resilience and protective factors following child maltreatment and concluded that family-level factors, namely stable family environment and supportive relationships, appeared to be linked with resilience across studies (Afifi & MacMillan, 2011). Another review article concluded that adaptive family functioning mediates the relationship between childhood adversity and child/adolescent mental health problems

(Scully et al., 2019). In particular, a few studies examined the protective role of family functioning in adolescent's health and emotional well-being based on the National Survey of Children's Health 2011/12 data (e.g., Balisteri & Alvira-Hammond, 2016; Moore & Ramirez, 2016). Another study also reported that adaptive family-level factors that are linked with family resiliency could mitigate the impacts of ACEs on adolescent's physical and mental health outcomes in military families (Oshri et al., 2015).

Community Level

A few studies have investigated protective factors at the school level. Clements-Nolle and Waddington (2019) examined potential protective factors from internal assets, family, and community levels with juvenile offenders who were 13-17 years old. The researchers reported that school connectedness and peer role model significantly reduced psychological distress in the presence of ACEs, and only school connectedness was found to moderate the relationship between ACEs and psychological distress. School belonging, similar to school connectedness, was reported to buffer some transitions from between ACEs to teen dating violence perpetration classes (Davis et al., 2019). Attending a safe school also was found to protect adolescents' emotional well-being from ACEs exposure based on NSCH data (Moore & Ramirez, 2016).

Several studies have examined protective factors in the community system. A study implemented a mediation model to test the protective mechanisms of social capital and civic engagement by using the NSCH 2016 data (Lu & Xiao, 2019). The researchers tested if social capital (i.e., neighborhood cohesion, community safety) and civic

engagement (i.e., community service, extracurricular activities) as moderators in the association between ACEs exposure and mental health of 12-17 aged adolescents by using the National Survey of Children Health. The investigators found that social capital and civic engagement had mediating effects in the relationship between ACEs and current mental disorders. Moore and Ramirez (2016) also concluded that community environment (e.g., supportive neighborhood, safe neighborhood) and engagement in community activities (e.g., participation in religious activity) serve as protective factors from ACEs for 12-17 aged adolescents' well-being.

Sex Differences associated with ACEs

Sex Difference in the Prevalence and Impacts of ACEs

Literature suggests that researchers have reported sex differences in the cumulative number of ACEs that individuals experience during their childhood. Females are usually found to report a higher number of ACEs than males (e.g., Merrick et al., 2018). Sex difference also exists in the prevalence of each adversity. A study that used nationally representative data (i.e., 2010 BRFSS) reported that females more frequently reported household mental illness, parental separation/divorce, while males more frequently reported incarceration of a household member and child abuse (Lee & Chen, 2017). Schilling and colleagues (2007) found sex differences in the prevalence of independent ACEs among high school seniors: boys were more likely experience physical abuse and witnessing violence than girls, while girls were more likely to

experience sexual abuse/assault and serious neglect. Merrick and colleagues (2018) also reported that females had experienced a greater prevalence of child sexual abuse, household substance abuse, and household mental illness than males among adult sample from the 2011-2014 BRFSS in 23 States.

It is posited that girls are more likely to have mental health outcomes associated with ACEs than boys, despite some of the inconsistent findings in the literature. A series of studies found that girls are more susceptible to the impacts of ACEs than boys. Girls appeared more vulnerable to the impacts of ACE exposure on overall well-being outcomes for both age groups: 6-11 and 12-17 (Balistreri, 2015) and emotional well-being (e.g., anxiety and depression) for only 12-17 aged adolescents (Balistreri & Alvira-Hammond, 2016). Other studies reported no significant differences or partial difference, depending on potential consequences, between male and female in the relationship between ACEs and mental health outcomes for the adolescent population (e.g., Schilling et al., 2007), early adulthood (e.g., Mersky et al., 2013) and adults in the U.S. (e.g., Lee & Chen, 2017). The current knowledge of sex difference associated with prevalence and impacts of ACEs indicates that the results may appear mixed and inconsistent contingent on age groups and outcome variables.

Sex Difference in the Protective Factors

Research on the protective factors in the association between ACEs and mental health outcomes has been mostly restricted to limited comparisons of girls and boys, by regarding the sex/sex variable as a covariate. Still, several studies highlighted sex

differences in the paths that protective factors mitigate the impacts of ACEs on psychological and behavioral outcomes of adolescents. Chatterjee and colleagues (2018) found that internal assets, such as social competency and positive identity, moderated associations of both abuse and household dysfunction with early initiation of marijuana and alcohol for only adolescent girls, not for boys. Several studies investigated the protective roles of family and community factors, but those studies regarded sex as a covariate (e.g., Balistreri & Alvira-Hammond, 2016; Moore & Ramirez, 2016; Robles et al., 2019), which remains a room for further research on the role of sex in the functions of protective factors.

Gaps in the Literature

Lack of Theoretical Framework

There are still substantial research gaps that need to be addressed. What is missing in the existing literature is that the underlying theoretical framework is not yet well defined in explanation of the relationship between childhood adversity and anxiety/depression, as well as protective factors in the relationship. Literature shows that most studies that investigated ACEs did not provide any theoretical or conceptual framework, despite a few studies that adopted social-ecological framework. This trend in the ACE literature might have been affected by the conventional ACE study by Felitti and colleagues (1998) that did not suggest any theoretical or conceptual model. Some

researchers, as a result, described the literature of ACEs as atheoretical (Evans & Whipple, 2013; Guinosso, 2015).

Few integrations of any theoretical framework in the ACEs literature might have resulted from the variability of the array of ACEs (Guinosso, 2015). The types and number of childhood adversity differ across various researchers, measures, and national datasets. In particular, researchers classify a certain type of childhood adversity in different ways: as an independent variable, as a covariate, or as a mediator. For example, some studies viewed income-related variables as a covariate (e.g., Cheong et al., 2017), another line of studies considered them as a part of ACE inventory (e.g., DeLisi et al., 2017), and other studies included them as both a covariate and a childhood adversity (e.g., Lanier et al., 2018). Whereas these different approaches have created an abundant discussion about the cumulative numbers, types, depth, and impacts of adverse childhood experiences, the inconsistency in the literature adds difficulties in building clear theoretical frameworks in the research of multiple childhood adversities.

Lack of Comparison between Anxiety and Depression

Researchers have established a firm relationship between ACEs and anxiety and depression. An accumulating body of research studies has also examined potential protective factors against the impacts of ACEs on anxiety and depression from an ecological systems perspective. Existing studies, however, have not attempted to compare different buffering roles of the protective factors between anxiety and depression. For example, Balistreri & Alvira-Hammond (2016) tested a moderating role

of family functioning in the association between cumulative ACE score and adolescent emotional well-being. This study used a composite score of emotional well-being based on adolescent anxiety and depression condition. The researchers found a significant buffering role of family functioning for adolescent emotional well-being, but they have not focused on the distinction between anxiety and depression. Given that the development of adolescent anxiety or depression is affected by a different set of individual ACEs, (Kim et al., 2020), protective factors against ACEs also may work differently for anxiety and depression.

Insufficient Evidence in Protective Factors for Adolescents

Another under-investigated issue is that there is insufficient information about protective factors in the relationship between adverse experiences during childhood and anxiety/depression in adolescence (Scully et al., 2019). A growing body of research has identified protective factors in the relationship between ACEs and later mental health conditions, such as individual resilience, emotional and social support, family-level factors, and community-level factors (See citations and detailed information from the previous section). Yet, many of the earlier studies targeted the adult population or other outcome variables from this study (i.e., anxiety and depression), calling for continued investigation of protective factors preventing adolescents' anxiety and depression from ACEs. Moreover, there is further room for examination of other protective factors for adolescents at the individual, family, and community level, beyond the current literature. Only a handful of studies examined family and community-related protective factors for

adolescents' mental health concerns from the impacts of ACEs, drawing the NSCH data (e.g., Balisteri & Alvira-Hammond, 2016; Moore & Ramirez, 2016).

Lack of Understanding of the Role of Sex

Given the social-ecological risk and protective factors model adopted in this study, it is imperative to examine how protective factors work with more careful consideration of multiple contexts. For example, there is room for investigation in the interactions between microsystems (i.e., mesosystem) or interactions between potential protective factors and individual characteristics. Particularly, little attention has been paid to the moderating role of sex in the relationship between cumulative ACEs and protective factors. Despite a few studies that focused on the sex difference in the prevalence of ACEs (e.g., Merrick et al., 2017; Schilling et al., 2007), impacts of ACEs (e.g., Balistreri & Alvira-Hammond, 2016; Lee & Chen, 2017) and protective mechanism from ACEs (e.g., Chatterjee et al., 2018), most studies treated sex as a covariate (e.g., Brown & Shillington, 2017; Felitti et al., 1998). Much of what is known about the role of sex is its moderating role in the relationship between ACEs and negative health outcomes or its role as a control variable. This remains much room for investigation on how sex interacts with ACEs and protective factors in ecological systems, such as family and community, in contributing or preventing adolescents' anxiety and depression.

Paucity of Implications for Counseling Professionals

Research studies on ACEs and mental health were widely implemented across different disciplines, generating implications for various populations within medicine, psychology, and social work (Zyromski et al., 2020). There have been few implications for professional counselors over the past twenty years of the research literature, although the topic of ACEs is closely related to the counseling profession (Wheeler et al., 2021; Zyromski et al., 2020). Zyromski and colleagues described the relevance of ACEs to the counseling profession with the following reasons: ACEs are pervasive, so counselors need to deal with clients who have experienced ACEs; ACEs have potentially wide-ranging negative effects on physical and mental health; ACEs are associated with numerous risk behaviors; and ACEs involve a social justice issue. Authors, in their content analysis of 22 journals affiliated with the American Counseling Association (ACA) and American School Counselor Association (ASCA) Journals, found that only three articles (0.03%) explicitly named ACEs in the title and abstract out of 9,120 articles. Zyromski and colleagues (2020) also pointed out that counseling researchers explored ACEs as isolated and individual events, not a cumulative index, limiting their knowledge and ability to examine ACEs' collective impact in research and practice. In light of the lack of counseling perspectives in the ACEs literature despite the topic's significance in the field, implications for counseling scholars and practitioners will help the professionals benefit the adolescents impacted by ACEs through continued research and ACE-informed prevention and intervention efforts.

Chapter 3

Methodology

Introduction

Few studies investigated interactions among ACEs, protective factors, and sex for adolescents' anxiety and depression associated with multiple ACEs, despite increasing studies that examined protective factors in the relationship between ACEs and adolescents' mental health problems. The overarching goal of this study was to build upon the existing literature about the protective factors from the impacts of adverse childhood experiences on anxiety and depression among adolescents in the U.S. in view of social-ecological risk and protective factors model. This study employed a social-ecological risk and protective factors model to investigate how sex, family, and community factors interact in mitigating the impacts of adverse childhood experiences on adolescents' anxiety and depression.

The findings of this study contribute to the benefit of counselors and other mental health professionals who work with adolescents with anxiety, depression, and/or multiple ACEs. This study results are meant to will help the practitioners uncover how protective factors work by sex in the relationship between ACEs and adolescents' anxiety and depression. The study especially provided information about how sex plays the moderating role in protective functioning of family and community systems. It also serves as a future reference for researchers who wants to investigate how multicultural

dimensions within an individual (e.g., sex, age, race/ethnicity, sexual orientation, disability) influence the impacts of ACEs and protective factors in ecological systems.

Research variables in this study fell into four categories: dependent variables, independent variable, moderating variable, and control variable. The dependent variables refer to the outcomes or results of the influence from the independent variables, and independent variables refer to cause or influence that affects outcome (Creswell, 2014). Anxiety and depression served as dependent variables, and a sum score of ACEs served as an independent variable. Moderating variables refer to independent variables that affect the strength and/or direction of the relationship between independent and dependent variables (Thompson, 2006). These moderating variables were constructed by taking a new variable and multiplying it by another to represent the joint impact of both variables on the dependent variable (Creswell, 2014). The moderating variables in this study included parental aggravation and their interaction terms. Several sociodemographic characteristics served as control variables, including age, race/ethnicity, and highest parental education level. Three research questions and subsequent hypotheses were as follows based on these research variables.

Research Question 1. What is the relationship between cumulative ACEs and anxiety/depression of adolescents in the U.S., after controlling predisposing factors (age, race, and highest parental education)?

Hypothesis 1.1. Cumulative ACEs is positively associated with the anxiety of adolescents after controlling for covariates.

Hypothesis 1.2. Cumulative ACEs is positively associated with the depression of adolescents after controlling for covariates.

Research Question 2. How do moderating variables (family resilience, parental aggravation, community activities, and neighborhood support) impact the relationship of cumulative ACEs and anxiety/depression of adolescents in the U.S., after controlling predisposing factors?

Hypothesis 2.1. Moderators from the family and community systems will reduce or increase the magnitude in the positive relationship between Cumulative ACEs and Anxiety, after controlling for covariates.

Hypothesis 2.2. Moderators from the family and community systems will reduce or increase the magnitude in the positive relationship between Cumulative ACEs and Depression, after controlling for covariates.

Research Question 3. Does sex impact the two-way interaction effects of cumulative ACEs and moderating variables (family resilience, parental aggravation, community activities, and neighborhood support) on anxiety/depression of adolescents in the U.S., after controlling predisposing factors, moderating variables, and two-way interactions?

Hypothesis 3.1. The way in which family and community moderators moderate the relationship between ACEs and anxiety will differ by sex, after controlling for covariates.

Hypothesis 3.2. The way in which family and community moderators moderate the relationship between ACEs and depression will differ by sex, after controlling for covariates.

For the hypotheses in the research question 3, it was difficult to build specific directions because of the scant attention in the existing literature to the role of sex in the

relationship between childhood adversity and adolescent mental health concerns. Figures 3-1 and 3-2 illustrate empirical models of the way conceptual model is tested.

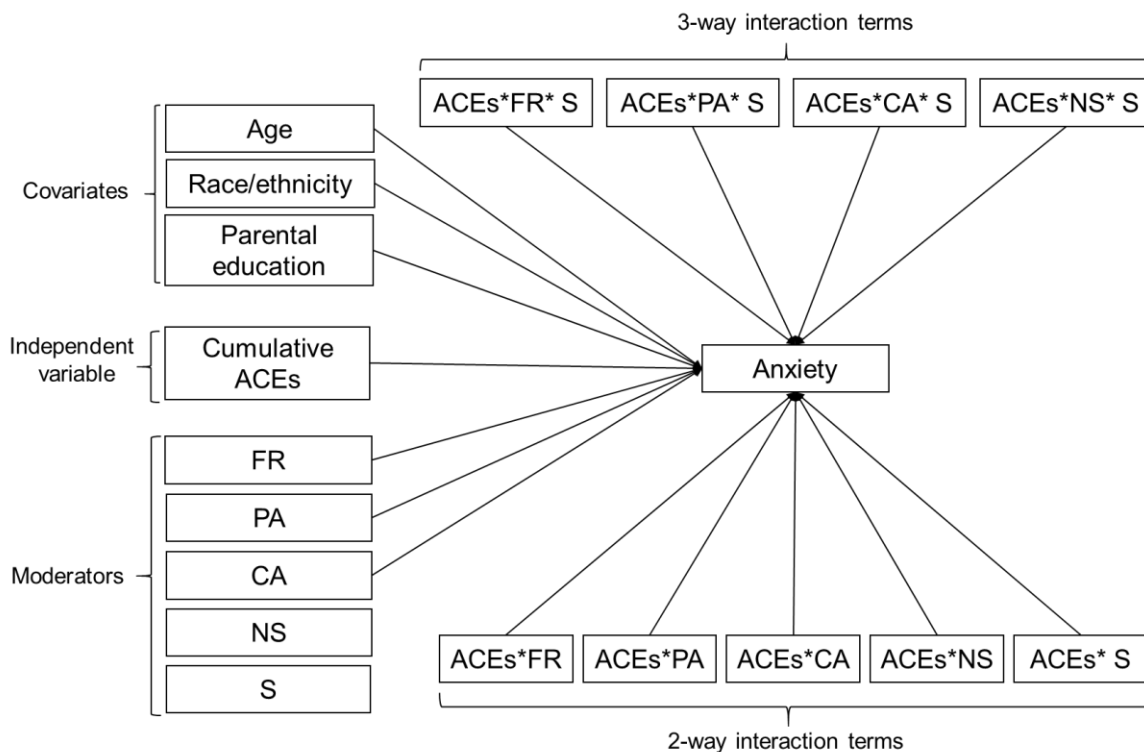


Figure 3-1: Statistical Diagram for the Current Study (Dependent Variable = Anxiety)

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support, S: sex

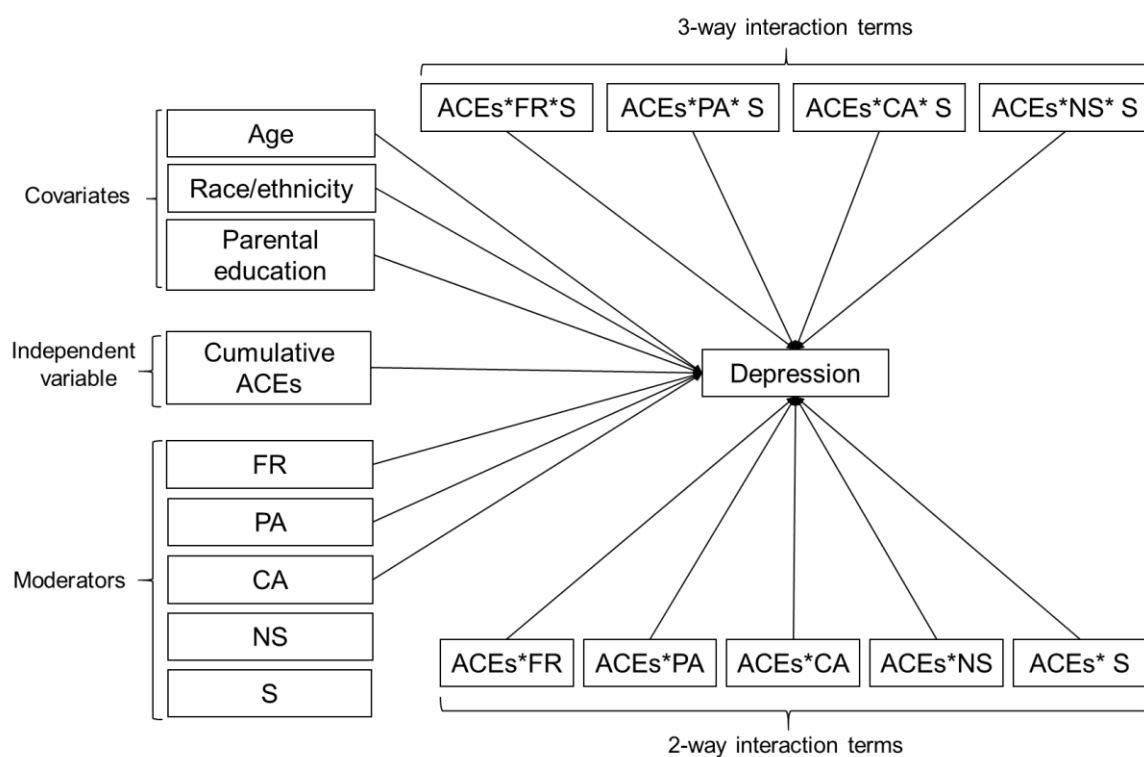


Figure 3-2: Statistical Diagram for the Current Study (Dependent Variable = Depression)

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support, S: sex

Research Design

This study adopted a quantitative research design to address the research questions. The current study implemented a quantitative investigation by using a nationally representative cross-sectional archival secondary data, the National Survey of Children's Health 2018-2019 (NSCH, 2018-2019). The use of a quantitative research design means a research approach that collects and analyzes numerical data to address research questions.

Cross-Sectional Design

The NSCH data carries a cross-sectional design. The cross-sectional design means the data were collected from research participants for a single time, instead of collected at two or more points in time (Christensen et al.,2014). A cross-sectional study design is widely used when the purpose of the study is to provide descriptive statistics, to find the prevalence of the outcome of interest, and to investigate associations between risk factors and the outcome of interest (Levin, 2006). Cross-sectional surveys are not only used to take a snapshot of one-time events; instead, they also have been frequently used to address all types of research questions (Stockemer, 2018). The use of cross-sectional surveys still allows researchers to administer inferential statistics, or a relationship between the independent and dependent variable, although it cannot establish a solid causal relationship.

Secondary Analysis Using Archival Data

Archival data refers to existing data, such as survey responses, records, texts, or other information, which are examined for various purposes (Fisher & Barnes-Farrell, 2013). Performing secondary analysis using existing data has potential advantages: larger and often national sample, more powerful statistics and population/subpopulation representative, circumvent data collection woes, objectivity, broader scope of variables, resource savings, and SPSS and SAS ready (Fisher, & Chaffee, 2019; Shultz et al., 2005). Potential challenges and disadvantages to using secondary data include the appropriateness of data (i.e., whether data is considered suitable for the intended research

purpose), intricate survey design, lack of desirable measurement properties, unique statistical skills required, and stagnation of theory (Fisher, & Chaffee, 2019; Shultz et al., 2005). Table 3-1 summarizes advantages and disadvantages of conducting analysis on archival data.

Table 3-1: Advantages and Disadvantages of Conducting Analysis on Archival Data

Potential advantages	Potential disadvantages
<ul style="list-style-type: none"> • Resources savings • Circumvent data collection woes • A variety of research designs and methodology possible • Usually SPSS or SAS ready • Relative ease of data transfer and storage • Use as pilot data/exploratory study • Large-scale survey • Newer and more powerful statistics • Availability of longitudinal data • Availability of international/ cross-cultural data • Organizations may be more open to using existing data versus collecting new data • Population/subpopulation representative • Broader scope of variables • Objective rather than subjective data • Suitable for student research projects due to its readily availability 	<ul style="list-style-type: none"> • Large, complex survey designs and databases • Sample weights required to consider • Lack of desirable measurement properties • Appropriateness of data • Missing data • Completeness of documentation • Detecting errors/sources often difficult if not impossible • Overall quality of data q Stagnation of theory • Lure of dustbowl empiricism • Unique statistical skills required • Illusion of quick and easy research • Convincing editors or thesis/dissertation advisors you are not simply duplicating existing research • Failure of students to develop skills required in planning and conducting data collection • Old and too much data

Note. This table was adjusted from Fisher & Chaffee (2019) and Shultz et al., (2005)

Internal and External Validity

This study involved both challenges and strengths in terms of validity. Validity falls into two major types: internal validity and external validity. Internal validity refers to the validity of the inference that the independent and dependent variables are causally related (Christensen et al., 2014). External validity means the degree to which the research findings can be generalized beyond the sample used for a study to different

people, setting, time, and geographic regions (Christensen et al., 2014; Lodico et al., 2010). The threats to internal validity include history, maturation, instrumentation, testing, regression artifacts, attrition, differential selection of subjects, and additive and interactive effects, while the threats to external validity involve preexisting interaction effects, selection bias, and reactive arrangement (Christensen et al., 2014; Lodico et al., 2010).

The challenges related to the internal validity can limit the credibility of inferential analyses of this study. The cross-sectional design of the NSCH data does not guarantee a causal relationship between variables. The characteristic of respondents, who were parents or guardians of children and adolescents, can weaken the internal validity because their responses may not be precise enough to represent adolescents' condition. For example, respondents might have over/underestimated family and community related variables (e.g., family resilience, neighborhood support). Measurement properties of the outcome variables (i.e., anxiety, depression) may abate the internal validity. The outcome variables were measured with a single binary item (i.e., yes/no) for each mental health concern, so those responses do not represent adolescents' anxiety and depression comprehensively. Moreover, the responses for the outcome variables might not rely on accurate information of a clinical diagnosis. Instead, the responses could be based on respondents' perception or misperception of their child, which may weaken internal validity.

These threats to internal validity weaken drawing a causal relationship between ACEs and adolescents' anxiety and depression, but the relational property of the independent and dependent variables of this study may buffer the weakening effect of the

threats on internal validity. The independent variable (i.e., ACE) conceptually antecedes the dependent variable (i.e., adolescents' anxiety and depression), despite the cross-sectional nature of the NSCH dataset. That is because the ACE items were asked to respond retrospectively based on past experience of children and adolescents, while the dependent variables were restricted to reflect the current mental health conditions. The present study is believed to carry good external validity overall thanks to rigorous sampling method that was designed to represent U.S. adolescents precisely across fifty states and the District of Columbia. More specific information about the procedures of the sampling design and data collection will be followed in the next section.

Procedures

The current study used the 2018-2019 National Survey of Children's Health (NSCH). 2018-2019 NSCH data is a nationally representative survey designed by the United States (US) Maternal and Child Health Bureau in partnership with the National Center for Health Statistics, Child and Adolescent Health Measurement Initiative, and a National Technical Expert Panel. The NSCH is conducted by the US Census Bureau, Associate Director for Demographic Programs on behalf of the US Department of Health and Human Services, HRSA MCHB. Additional funding for specific questions on the 2018 and 2019 surveys was provided by Centers for Disease Control and Prevention (CDC), National Center on Birth Defects and Developmental Disabilities (NCBDDD), United States Department of Agriculture (USDA), Food and Nutrition Service, and the United States Environmental Protection Agency (EPA).

The purpose of the NSCH is to collect information on factors related to the wellbeing of children, such as access to and quality of health care, family interactions, parental health, school and after-school experiences, and neighborhood/community characteristics. The 2018 and 2019 NSCH data were combined into a 2018-2019 version to allow researchers to have more abundant opportunities to conduct analyses with a larger sample size as well as more complex cross-tabs among variables (Child and Adolescent Health Measurement Initiative, 2020). Respondents of the 2018-2019 NSCH data were parents or caregivers of children, across the fifty states and the District of Columbia. The data were weighted to be representative of the US population of non-institutionalized children ages 0-17, which means that missing values were adjusted through multiple imputation for several demographic variables, including child sex, race, Hispanic origin, parental education level, and household size. Multiple imputation is useful because this method uses observed data to estimate a plausible response where it is missing.

The 2018-2019 NSCH used an address-based nationwide sample was administered the survey by both online and mail. Randomly selected addresses from households across the United States were mailed instructions to access the survey online and some addresses also received a paper version of the screening questionnaire. Respondents filled out the screening items with age and sex of all children in household. One child from each household was randomly selected to be the subject of the main questionnaire. After two reminder letters and postcard reminders to complete the survey by web, those households who had not accessed the online survey were mailed a paper screening questionnaire. Participants could request a paper copy of the screener and

questionnaire in case they did not want to complete it online. The 2018 survey was administered between June 2018 and January 2019, and the 2019 survey was implemented between June 2019 and January 2020. Figure 3-3 demonstrates the survey administration procedure.

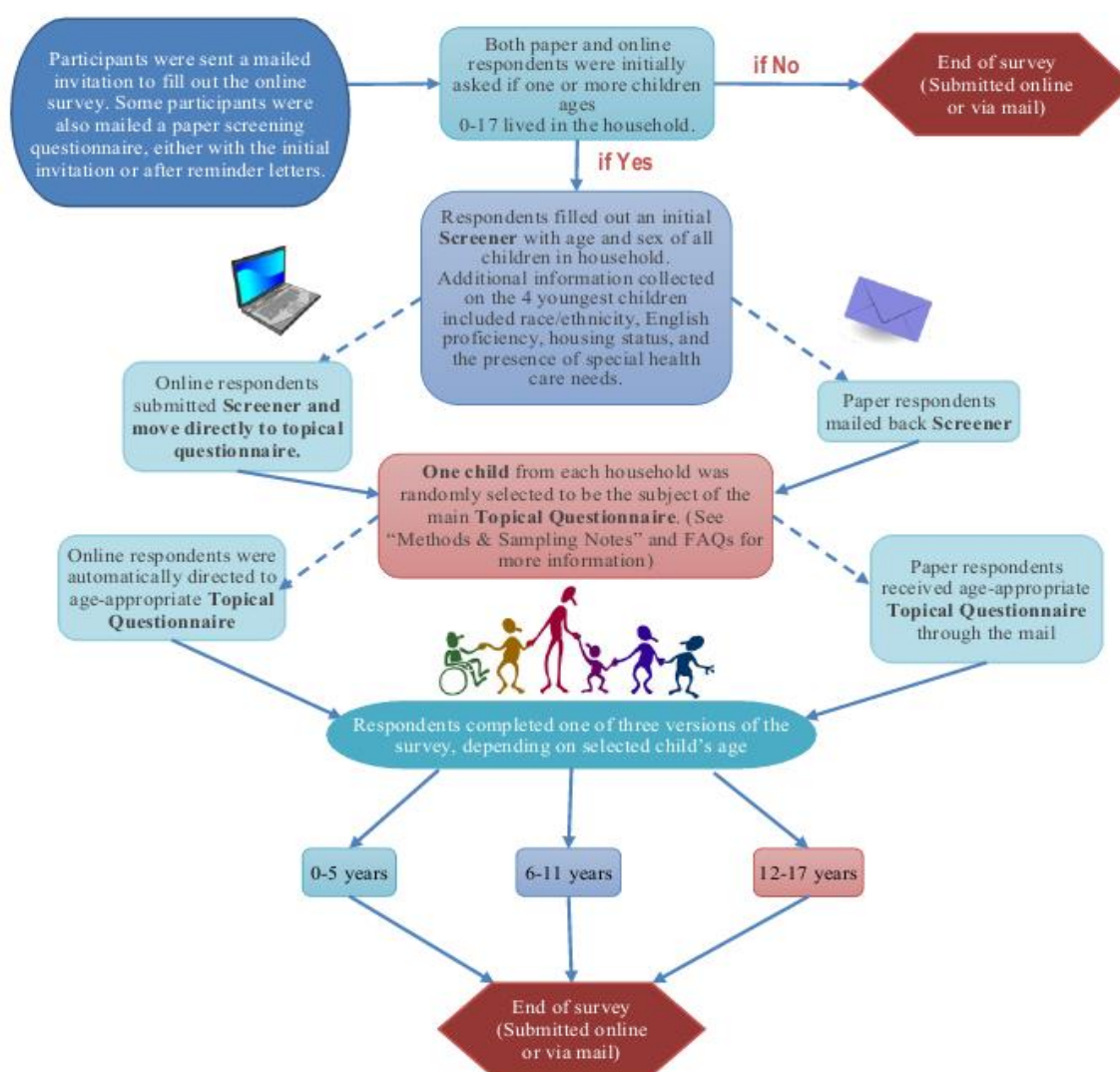


Figure 3-3: Survey Administration Procedure of the National Survey of Children Health for 2018-2019 NSCH Data

Child and Adolescent Health Measurement Initiative (2019; 2020)

The survey consists of eleven questionnaire sections, from Section A to Section K. Section A is to ask the child's health, whether the child has a current or history of physical, mental, behavioral, learning, or developmental health conditions that affect their ability to do things. Section B covers the child as an infant with birth-related questions, such as birth weight or breastfeeding. Section C involves items about health care services, including medical, dental, mental, and specialized health serviced in the last 12 months. Section D asks for information about an experience with the child's health care providers, such as frequency and satisfaction with the child's health care provides. Section E includes items of the child's health insurance coverage in the past 12 months. Section F involves questions on cost and time spent providing for the child's health care. Section G deals with the child's learning/schooling and activities related to early development for 1-5 aged children and participation in school and out-of-school activities for 6-17 aged children. Section H asks questions about daily life and household activities of the child. Section I includes questions about the child's family and household environments, such as adverse childhood experiences and familial coping. Section J asks for demographic information about the child's caregivers. Section K asks questions about further details of household, such as family income and family count.

For this study, items of dependent variables (i.e., anxiety, depression) were drawn from Section A, items of independent variables (i.e., ACEs) were drawn from Section I, and moderating variables (i.e., family resilience, parental aggravation, community activities, and neighborhood support) were drawn from Section G (community factors) and H/I (family factors).

Study Sample

The target population of the NSCH consists of children ages ranging from 0 to 17. Respondents, who were parents or caregivers of children, completed one of three versions of the survey, depending on the selected child's age (0-5, 6-11, and 12-17 years old). A total of 59,963 surveys were administered for 2018 and 2019 combined. 30,530 surveys were completed in 2018 and 29,433 in 2019. The Overall Weighted Response Rate was 43.1% for 2018 and 42.4% for 2019. The 2018 and 2019 combined data set contains approximately 1,176 surveys per state on average (state range: 1,021 to 1,420). Survey data were weighted to represent the population of noninstitutionalized children ages 0-17 who live in housing units nationally and in each state.

The sample in this study was limited to ages 12-17 to represent the adolescent population in the U.S, who is a target population of the current study. Among a total of 59,963 respondents, the sample was limited to 12-17 aged adolescents, resulting in 24,817 cases. The final analytic sample for the current study was 23,242 after deleting cases with missing values. Table 3-2 shows descriptive statistics of the analytic sample of this study.

Table 3-2: Descriptive Statistics of the Analytic Sample (n = 23,242)

	Total (n = 23,242)	Male (n = 12,135)	Female (n = 11,107)
	n (%)	n (%)	n (%)
Race/ethnicity			
<i>White, non-Hispanic</i>	16,481 (70.91)	8,692 (71.63)	7,789 (70.13)
<i>Hispanic</i>	2,612 (11.24)	1,343 (11.07)	1,269 (11.43)
<i>Black, non-Hispanic</i>	1,477 (6.35)	776 (6.39)	701 (6.31)
<i>Asian, non-Hispanic</i>	1,132 (4.87)	545 (4.49)	587 (5.28)
<i>Other/Multi-racial, non-Hispanic</i>	1,540 (6.63)	779 (6.42)	761 (6.85)

Parental highest education level			
<i>Less than high school</i>	644 (2.77)	329 (2.71)	315 (2.84)
<i>High school or GED</i>	3,163 (13.61)	1,690 (13.93)	1,473 (13.26)
<i>Some college of technical school</i>	5,511 (23.71)	2,884 (23.77)	2,627 (23.65)
<i>College degree or higher</i>	13,924 (59.91)	7,232 (59.60)	6,692 (60.25)
ACEs			
<i>0 ACE</i>	12,896 (52.70)	6,701 (52.49)	6,195 (52.96)
<i>1 ACE</i>	5,834 (23.84)	3,078 (24.10)	2,756 (23.56)
<i>2-3 ACEs</i>	3,986 (16.29)	2,076 (16.25)	1,910 (16.33)
<i>4 or more ACEs</i>	1,755 (7.17)	919 (7.19)	836 (7.15)
Anxiety (Yes)	3,543 (15.24)	1,492 (12.30)	2,051 (18.47)
Depression (Yes)	1,925 (8.28)	764 (6.30)	1,161 (10.45)
	M (SD)	M (SD)	M (SD)
Age	14.69 (1.70)	14.68 (1.70)	14.69 (1.70)
ACEs (cumulative index)	.97 (1.43)	.97 (1.42)	.97 (1.45)
Family resilience	3.34 (.60)	3.34 (.60)	3.34 (.60)
Parental aggravation	1.75 (.70)	1.78 (.72)	1.73 (.68)
Community activities	1.73 (1.01)	1.61 (1.00)	1.86 (1.00)
Neighborhood support	3.32 (.65)	3.32 (.65)	3.32 (.66)

Measures

Dependent Variable

Anxiety and depression representing adolescents' mental health conditions were selected as outcome variables. Anxiety and depression were part of a series of 27 health condition items. These health condition items were asked to only those whose children ages 3-17 years old. The Respondents were asked to answer, "Has a doctor or other health care provider ever told you that this child has anxiety?" and "Has a doctor or other health care provider ever told you that this child has depression?" Response options for these two single items included "yes" or "no." For those who responded "yes" to the

previous item, respondents were asked to answer a follow-up question, “If yes, does this child currently have the condition?” Response options again were “yes” or “no.” In this study, these binary items asking current condition of anxiety and depression served as outcome variables for two different hierarchical binary logistic regression models, respectively.

Independent Variable

The independent variables in the analyses were a cumulative index of different types of adverse childhood experiences. Childhood adversity consisted of nine questions and was adjusted and reworded for clarity. Respondents who are either a parent or guardian were asked to respond to the following nine items regarding their children: (a) difficulty getting by on family’s income/basics like food or housing (*income hardship*); (b) parent or guardian divorced or separated (*divorce*); (c) parent or guardian died (*parental death*); (d) parent or guardian served time in jail (*jail*); (e) saw or heard parent or adults slap, hit, kick, punch one another in the home (*domestic violence*); (f) victim/witness of neighborhood violence (*neighborhood violence*); (g) lived with anyone who was mentally ill, suicidal, or severely depressed (*mental health*); (h) lived with anyone who had a problem with alcohol or drugs (*drug*); and (i) the child was treated or judged unfairly because of his/her race or ethnic group (*discrimination*). Response options for all of the items, except for income hardship, were originally dichotomous (i.e., yes/no). Income hardship, which originally had four response options (i.e., never, rarely, somewhat often, and very often), were dichotomized. “Somewhat often” and

“very often” were recoded as “yes”, while “rarely” and “never” were recoded as “No”. A sum score of the nine adverse childhood experiences will be obtained, ranging from 0 to 9 to assess the cumulative ACEs.

Moderating Variable

Moderators in this study comprised five variables: family resilience, parental aggravation, community activities, neighborhood support, and sex. Family resilience and parental aggravation were included as family factors. Community activities and neighborhood support were included as community factors.

Family Resilience

Family resilience involved four different survey items as a composite measure. Respondents were asked to answer to “when your family faces problems, how often are you likely to do each of the following”: (a) talk together about what to do (Talking together); (b) work together to solve our problems (Problem solving); (c) know we have strengths to draw on (Strengths); and (d) stay hopeful even in difficulty times (Hopeful). Response options were four-point Liker scale, ranging from “all of the time” to “most of the time” to “some of the time” and “none of the time”. Cronbach’s alpha for family resilience was .90 in this study.

Parental Aggravation

Respondents were also asked to indicate *parental aggravation* with three questions. The questions included: how often “they felt that their child was much harder to care for than other children”, “they were bothered a lot their child’s behavior” and “they felt angry with their child in the past month.” Response options included “never”, “rarely”, “sometimes”, “usually” and “always.” Cronbach’s alpha for parental aggravation was .81 based on the current study’s responses.

Community Activities

Community activities consisted of three binary items assessing participation in community-based activities: (a) sports teams or sports lessons; (b) clubs or organization; (c) any other organized activities or lessons, particularly music, dance, language or other arts. Response options included “yes” and “no.” Cronbach’s alpha for community activities was not calculated because this variable was included for the analyses to indicate whether adolescents participate in those three types of community activities, not the ‘level’ of engagement or in activities. For this reason, this variable served as ‘sum scores,’ such as the ACEs sum scores, instead of a single ‘construct.’ Sum scores ranged from 0, when they responded “no” to all items, to 3 when they answered “yes” to all items.

Neighborhood Support

Neighborhood support comprised three items with four-point Likert scale ranging from 1 (definitely disagree) to 4 (definitely agree). Items assessing neighborhood support include “people in neighborhood help each other out,” “we watch out for each other's children in this neighborhood,” and “when we encounter difficulties, we know where to go for help in our community.” Cronbach’s alpha for neighborhood support was .80 in this study.

Sex

Sex is a binary item, which consists of male and female. The first category, boys, served as the reference group in the hierarchical binary logistic regression models.

Covariates

Prior work suggested that sociodemographic characteristics were associated with the outcome variables, or adolescent’s anxiety and depression. Sociodemographic characteristics will be included as control variables, such as age, race/ethnicity, and parental education level, except for sex.

Age

A single item measured child's age. Age was treated as a continuous variable, while other variables were included as categorical variables. Age originally ranged from 0 to 17 in the NSCH survey, but the range was restricted to between 12 and 17 in order to represent the adolescent population.

Race/Ethnicity

The term race distinguishes major groups of people according to their ancestry and distinctive combination of physical characteristics, while ethnicity focuses on the distinction between groups of people based on behavior and culture as well as biology and physical characteristics (Edwards et al., 2001). A race/ethnicity item was categorized as (a) White, non-Hispanic; (b) Hispanic, (c) Black, non-Hispanic; (d) Asian, non-Hispanic; and (e) Other/Multiracial, non-Hispanic. The "Other/Multicultural, non-Hispanic" option included "American Indian or Alaska Native", "Native Hawaiian or other Pacific Islander", and "one or more race." The first category, White non-Hispanic, served as the reference group in the hierarchical binary logistic regression models.

Parental Education Level

The respondents were asked to report the highest education of a primary caregiver in child's household. Four options were provided: (a) less than high school, (b) high school or GED, (c) some college or technical school, and (d) college degree or higher.

The first category, less than high school, served as the reference group in the hierarchical binary logistic regression models.

Data Analysis

Statistical analyses proceeded in multiple steps. To begin with, preliminary analyses were implemented. Preliminary analyses primarily comprised of missing data analyses and assumption testing for binary logistic regression models. For missing data analyses, missing value analysis using SPSS 26 was conducted for research variables. Assumption testing was guided by statistical guideline articles (Garson, 2014; Menard, 2002; Midi et al., 2010) for binary logistic regression. I considered correlation coefficients and used linear regression with options of Variation Inflation Factor (VIF) and tolerance to diagnose multicollinearity of the logistic regression models.

Descriptive statistics analyses were followed after the preliminary analyses to examine the relationships among key variables and sex differences in the variables. Descriptive analyses included independent t-tests, Chi-square tests, and bivariate correlation analyses. Independent t-tests aimed to identify mean differences in family and community variables (i.e., family resilience, parental aggravation, community activities, and neighborhood support) by sex. Chi-square statistic is a non-parametric (distribution-free) tool for analyzing group differences when the dependent variable consists of a nominal variable, so it is widely used when the level of measurement of all the variables is nominal or ordinal (McHugh, 2013). The Chi-square tests fit well with the measures of the current study because the key variable of the current study, such as

anxiety, depression, and sex, are nominal and dichotomous. Cumulative ACEs were recoded as a categorical variable with four groups (i.e., No ACEs, 1 ACE, 2-3 ACEs, and 4 or more ACEs) so that it can meet the satisfying condition of Chi-square tests. Chi-square tests in this study consisted of two parts: comparison of the prevalence of adolescent anxiety and depression by 1) cumulative ACEs and 2) sex. Bivariate correlation analyses were conducted to find out statistically significant associations between variables before the logistic regression models.

Hierarchical binary logistic regression model was employed to control the advancement of the regression process. Hierarchical regression model has been used when researchers are interested in examining the influence of several sets of predictors in a sequential way, which involves theoretically based decisions in the way predicting variables entered into the analysis (Petrocelli, 2003). Logistic regression analysis is commonly used to examine the relationship between a set of independent variables and a categorical or binary dependent variable (Hair, 2010; Huck, 2008). It is considered binary logistic regression when the outcome variable is a binary item with only two response options (e.g., Yes or No) such as the current study. Logistic regression analyses attempt to model the odds of an occurrence of an outcome and to estimate the impacts of independent variables on these odds (O'Connell, 2006). A series of the result, such as an overall evaluation of the model, statistical tests of predictor, goodness-of-fit statistics, and an assessment of the predicted probabilities, will be reported following recommendations (Peng et al., 2002).

Hierarchical binary logistic regression analysis for each dependent variable (i.e., anxiety, depression) will be conducted with four sequential blocks. Block 1 includes

sociodemographic characteristics (i.e., age, race/ethnicity, parental education level) as control variables following recommendations from Tabachnick and Fidell (2007). Block 2 involves independent variable (i.e., cumulative index of ACEs) and moderating variables (i.e., family resilience, parental aggravation, community activities, and neighborhood support, and sex). Block 3 includes five two-way interaction terms among moderators (i.e., ACEs*family resilience, ACEs*parental aggravation, ACEs*community activities, ACEs*neighborhood support, and ACEs*sex). Block 4 comprises three-way interactions terms between among (ACEs*family resilience*sex, ACEs*parental aggravation*sex, ACEs*community activities*sex, and ACEs*neighborhood support*sex).

Table 3-3 describes a summary of study variables, including dependent variables, independent variable, moderating variables, and control variables, with description of each measure and item. Table 3-4 shows sequential steps of data analyses from preliminary analysis to descriptive analysis to hierarchical binary logistic regression model. Table 3-5 indicates sequential steps of the hierarchical binary logistic regression models for anxiety and depression.

Table 3-3: Summary of Study Variables and Measures

	Category	Variable	Items
DV	Mental health conditions	Anxiety	• Children who currently have anxiety problems
		Depression	• Children who currently have depression
IV	ACEs	Income hardship	• How often has it been hard to get by on your family's income - hard to cover basics like food or housing?
		Divorce	• Parent or guardian divorced or separated
		Parental death	• Parent or guardian died
		Jail	• Parent or guardian served time in jail

		Domestic violence	<ul style="list-style-type: none"> Saw or heard parents or adults slap, hit, kick, punch one another in the home
		Neighborhood violence	<ul style="list-style-type: none"> Victim/witness of neighborhood violence
		Mental health	<ul style="list-style-type: none"> Lived with anyone who was mentally ill, suicidal, or severely depressed
		Alcohol/drug	<ul style="list-style-type: none"> Lived with anyone who had a problem with alcohol or drug
		Discrimination	<ul style="list-style-type: none"> Treated or judged unfairly because of his/her race or ethnic group
MV	Family factors	Family resilience (4 items)	<ul style="list-style-type: none"> When your family faces problems, how often are you likely to do each of the following? Talk together about what to do Work together to solve our problems Know we have strengths to draw on Stay hopeful even in difficult times
		Parental aggravation (3 items)	<ul style="list-style-type: none"> Parent felt child is much harder to care for than most children during the past month Parent felt child does things that bother them during the past month Parent felt angry with child during the past month
	Community factors	Community activities (3 items)	<ul style="list-style-type: none"> Participation in sports teams or sports lessons after school or on weekends Participation in clubs or organizations after school or on weekends Participation in any other organized activities or lessons, such as music, dance, language or other arts
		Neighborhood support (3 items)	<ul style="list-style-type: none"> People in neighborhood help each other out. We watch out for each other's children in this neighborhood. When we encounter difficulties, we know where to go for help in our community.
		Sex	<ul style="list-style-type: none"> What is this child's sex?
CV	Socio-demographic characteristics	Age	<ul style="list-style-type: none"> What is this child's age?
		Race/ethnicity	<ul style="list-style-type: none"> What is this child's race/ethnicity?
		Parental education level	<ul style="list-style-type: none"> What is the highest education of adult in this child's household?

Note: DV=dependent variable; IV=independent variable; MV=moderating variable; CV=covariates

Table 3-4: Sequential Steps for Data Analysis

Stage	Analysis	Objective
Stage1. Preliminary Steps	Data request and acquirement	<ul style="list-style-type: none"> Making a request of the data to the data resource center through the website and obtaining the data

		(https://www.childhealthdata.org/)
	Data preparation	<ul style="list-style-type: none"> Narrowing down to the analytic sample Creating composite/sum scores
	Missing data analysis	<ul style="list-style-type: none"> Maximum likelihood (ML) estimation
		•
Stage 2. Descriptive analysis	Descriptive statistics	<ul style="list-style-type: none"> Sample characteristics Frequency of ACEs Frequency of anxiety and depression Frequency of protective factors
	Chi-square test	<ul style="list-style-type: none"> Tests between prevalence of each ACE and categorical sociodemographic characteristics
	Correlation analysis	<ul style="list-style-type: none"> Analyses between sum score of ACEs and age
	Assumption test	<ul style="list-style-type: none"> Linearity Multicollinearity
Step 3. Hierarchical binary logistic regression	Hierarchical binary logistic regression (DV: anxiety and depression respectively)	<ul style="list-style-type: none"> Block 1: CVs (age, race, parental education) Block 2: IV (sum score of ACEs), MV (family functioning, community environment, and sex) Block 3: two-way interaction terms among MVs (ACEs*family functioning, ACEs*community environment, and ACEs*sex). Block 4: three-way interactions terms among ACEs, MVs, and sex (ACEs*family functioning*sex, and ACEs*community environment*sex).

Note: IV=independent variable; MV=moderating variable; CV=control variable; DV=dependent variable

Table 3-5: Sequential Steps for Binary Logistic Regression Models

	Model 1	Model 2	Model 3	Model 4	Model 5
Step 1	Age	Age	Age	Age	Age
	Race	Race	Race	Race	Race
	Parental education	Parental education	Parental education	Parental education	Parental education
Step 2		Cumulative ACEs	Cumulative ACEs	Cumulative ACEs	Cumulative ACEs
Step 3			FR	FR	FR
			PA	PA	PA
			CA	CA	CA
			NS	NS	NS
			S	S	S
Step 4				FR*ACEs	FR*ACEs
				PA*ACEs	PA*ACEs
				CA*ACEs	CA*ACEs
				NS*ACEs	NS*ACEs
Step 5					FR*ACEs*S
					PA*ACEs*S
					CA*ACEs*S

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support. S: sex.

Chapter 4

Results

The purpose of this study was to investigate the relationships between cumulative ACEs and adolescent anxiety/depression and examine moderating roles of several family and community variables, such as family resilience, parental aggravation, community activities, neighborhood support, and sex in the relationships. The current investigation used the 2018-2019 NSCH data and employed hierarchical binary logistic regression analyses to address the following research questions and hypotheses.

Research Question 1. What is the relationship between cumulative ACEs and anxiety/depression of adolescents in the U.S., after controlling predisposing factors (age, race, and highest parental education)?

Hypothesis 1.1. Cumulative ACEs is positively associated with the anxiety of adolescents after controlling for covariates.

Hypothesis 1.2. Cumulative ACEs is positively associated with the depression of adolescents after controlling for covariates.

Research Question 2. How do moderating variables (family resilience, parental aggravation, community activities, and neighborhood support) impact the relationship of cumulative ACEs and anxiety/depression of adolescents in the U.S., after controlling predisposing factors?

Hypothesis 2.1. Moderators from the family and community systems will reduce or increase the magnitude in the negative relationship between Cumulative ACEs and Anxiety, after controlling for covariates.

Hypothesis 2.2. Moderators from the family and community systems will reduce or increase the magnitude in the negative relationship between Cumulative ACEs and Depression, after controlling for covariates.

Research Question 3. Does sex impact the two-way interaction effects of cumulative ACEs and moderating variables (family resilience, parental aggravation, community activities, and neighborhood support) on anxiety/depression of adolescents in the U.S., after controlling predisposing factors, moderating variables, and two-way interactions?

Preliminary Analyses

Missing Data Analysis

Missing data are statistically defined as an incomplete data matrix that occurs when one or more participants in a sample do not respond to all items (Newman, 2014). Missing values occurred for multiple reasons, including legitimate skip (i.e., the item is not applicable to the respondent), missing in error (i.e., the value is missing due to respondent or system errors), not in universe (i.e., the item was not included on the respondent's age), and suppressed for confidentiality (i.e., the value is suppressed to protect respondent confidentiality), in the NSCH data collection administration (The U.S. Census Bureau, 2020). Missing and invalid responses were replaced with multiply imputed values by the survey administrator. Missing data for child's sex, race/ethnicity, and adult education were treated using a complex, simultaneous imputation method by

the NSCH and provided within the publicly available datasets. Sex and race/ethnicity were imputed using hot-deck imputation, and adult education was imputed using sequential regression imputation methods (The U.S. Census Bureau, 2020).

The amount of missing data ranged from .00% to 3.52% across research variables, which can be considered as insignificant amounts (Kline, 2011; Tabachnick & Fidell, 2007). Specifically, age had no missing values, ACE sum score had 1.39%, anxiety had 0.8% ($n = 208$), depression had 0.7% ($n = 163$), family resilience had 1.39% ($n = 344$), parental aggravation had 1.03% ($n = 255$), community activities had 3.52% ($n = 873$), and neighborhood support had 1.95% ($n = 483$) missing values. No missing values were identified for sex, race/ethnicity, and adult education because missing and invalid responses were replaced with multiply imputed values for those variables. I subsequently performed Little's Missing Completely At Random (MCAR) test to check the pattern of missing data, revealing statistically significant results, $\chi^2(88) = 125.11, p = .006$. The result of Little's MCAR test indicates that null hypothesis is rejected and the data were not missing completely at random. Newer and principled methods in dealing with missing data, such as multiple imputation (MI) method, the full information maximum likelihood (FIML), and the expectation-maximization (EM) method, may not be suitable in this case because these methods assume the data with MCAR. Also, it was difficult to find the pattern of missingness because there were no variables with 5% or more missing values, which resulted in failure to produce t-test tables for missing pattern analysis.

Statistical guidance articles have stated that biases and loss of power are both likely to be inconsequential if the loss of cases due to missing data is small, such as 5% or 10% (e.g., Dong & Feng, 2013; Graham, 2009; Schafer, 1999). I found out that 5.81%

($n = 1,443$) cases were excluded for logistic regression models predicting depression and 5.98% ($n = 1,487$) for anxiety. Thanks to the low missingness in the data, I adopted listwise deletion method guided by Graham (2009). A total of 6.35% ($n = 1,575$) cases were deleted from the entire 12-17 aged adolescents ($n = 24,817$), which resulted in 23,242 cases as the final analytic sample for descriptive statistics and hierarchical binary logistic regression models.

Assumption Testing for Logistic Regression

The assumptions of the binary logistic regression model were examined to prevent biased coefficients, inefficient estimates, and invalid statistical inferences (Menard, 2002; Midi et al., 2010). Logistic regression is widely used in part because it is free from many restrictive assumptions of Ordinary Least Squares (OLS) regression. For example, logistic regression does not assume a linear relationship between the dependent variable and independent variables (Garson, 2014). The dependent variable need not be normally distributed, and the independent variable does not need to be interval or unbounded.

Other assumptions still apply for the logistic regression analysis, as suggested by Garson (2014): categorical dependent variable, model specification, linearity, multicollinearity, and centering. A dichotomous or polytomous dependent variable (i.e., categorical variable) is assumed for binary or multinomial logistic regression, respectively. This study selected two binary items, assessing current conditions of anxiety and depression (i.e., yes/no), as outcome variables for two different sets of binary

logistic regression models. It is recommended to include all relevant variables and exclude all irrelevant variables to acquire the proper specification of the model (Midi et al., 2010). Relevant variables which might affect the model specification will be included as covariates, or control variables. A linear relationship between the continuous independent variable and the log odds (logit) of the dependent variable, although logistic regression does not require a linear relationship between independent and dependent factors. The problem of multicollinearity may occur in logistic regression as the independent variables are highly correlated. Multicollinearity will be examined using the Variation Inflation Factor (VIF) value and level of tolerance. Centering can be beneficial in reducing multicollinearity and making interpretation of coefficients convenient and meaningful. Centering refers to the act of subtracting a variable mean score from all observations on that variable in the dataset resulting in the variable's new mean as almost zero (Iacobucci et al., 2016). It is assumed that the distribution of errors follows a binomial distribution in a logistic regression, which approximates a normal distribution only for large samples (Menard, 2002).

Multicollinearity of the fitted models was diagnosed with correlation coefficients between variables and collinearity diagnosis indexes, such as Variation Inflation Factor (VIF) and tolerance, followed by statistical guidance articles for logistic regression model (Menard, 2002; Midi et al., 2010). Correlation matrix determined that no strong correlated variables were identified among predictive variables (see Table 4-3 for more details). I further examined the VIF and tolerance index following the suggestion by Midi and colleagues (2010). VIF and tolerance can be produced by linear regression. VIF scores higher than 10 or a level of tolerance of less than .10 indicates a critical

concern in multicollinearity (Menard, 2002). The result of linear regression with the option of tolerance and VIF confirmed no concern in multicollinearity (VIF ranged from 1.02 to 1.20; tolerance ranged from .84 to .98).

Descriptive Findings

Descriptive findings were sought to find out relationships among key variables and sex differences in those variables. Descriptive analyses included independent *t*-tests, Chi-square tests, and bivariate correlation analyses.

Mean Differences in the Family and Community Factors by Sex

I compared the mean scores of moderating variables from the family and community systems to determine whether they differed by sex. A series of independent *t*-tests by sex were implemented to identify the mean differences for family resilience, parental aggravation, community activities, and neighborhood support. As shown in Table 4-1, parental aggravation and community activities presented significant mean differences between boys and girls, while family resilience and neighborhood support did not show significant mean differences. Caregivers of boys reported slightly higher parental aggravation in comparison with girls, and adolescent girls were found to participate in more community activities than adolescent boys. Table 4-1 describes the result of the independent *t*-tests by sex for family and community factors.

Table 4-1: Independent T-tests by Sex for Family and Community Factors

Variables	Total (n = 23,242)		Male (n = 12,135)		Female (n = 11,107)		T
	M	SD	M	SD	M	SD	
Family resilience	3.34	.60	3.34	.60	3.34	.60	-.75
Parental aggravation	1.75	.70	1.78	.72	1.73	.68	5.19***
Community activities	1.73	1.01	1.61	1.00	1.86	1.00	-18.94***
Neighborhood support	3.32	.65	3.32	.65	3.32	.66	.51

*** $p < 0.001$

Chi-Square Tests between Cumulative ACEs and Anxiety/Depression

I conducted Chi-square tests in order to compare the prevalence of anxiety and depression depending on the number of ACEs that adolescents had experienced. Four groups were created by the number of ACEs that adolescents had experienced: No ACEs, 1 ACE, 2-3 ACEs, and 4 or more ACEs. Results of the Chi-square tests were statistically significant: $\chi^2(3) = 860.23$, $p < 0.001$ for anxiety and $\chi^2(3) = 1188.29$, $p < 0.001$ for depression. The prevalence of anxiety among 12-17 aged U.S. adolescent sample appeared as 10.44% for No ACEs group, 15.18% for 1 ACE group, 22.50% for 2-3 ACEs group, and 34.81% for 4 or more ACEs group. The prevalence of depression was found as 4.06% for No ACEs group, 8.01% for 1 ACE group, 14.66% for 2-3 ACEs group, and 26.23% for 4 or more ACEs group. In conclusion, adolescent subgroups who had experienced higher number of cumulative ACEs reported higher prevalence of both anxiety and depression.

Chi-Square Tests between Sex and Anxiety/Depression

I also performed two additional Chi-square tests to investigate the associations between sex and the prevalence of anxiety and depression. As presented in the descriptive statistics of the analytic sample (see Table 3-2 in Chapter 3), adolescent girls showed higher prevalence in both mental health conditions than boys. More specifically, the prevalence of anxiety for 12-17 aged adolescent boys was 12.30%, while the prevalence was 18.47% for girls. The prevalence of depression appeared as 6.30% for boys and 10.45% for girls. Chi-square tests determined that these sex differences in the prevalence of anxiety and depression were statistically significant [$\chi^2 (1) = 170.92$, $p < 0.001$ for anxiety and $\chi^2 (3) = 131.92$, $p < 0.001$ for depression]. In sum, 12-17 aged adolescent girls showed a significantly higher prevalence of both mental health conditions than adolescent boys. Figure 4-1 visualizes the prevalence of anxiety and depression by eight (2×4) subgroups, combined with sex ($n = 2$) and the number of cumulative ACEs ($n = 4$).

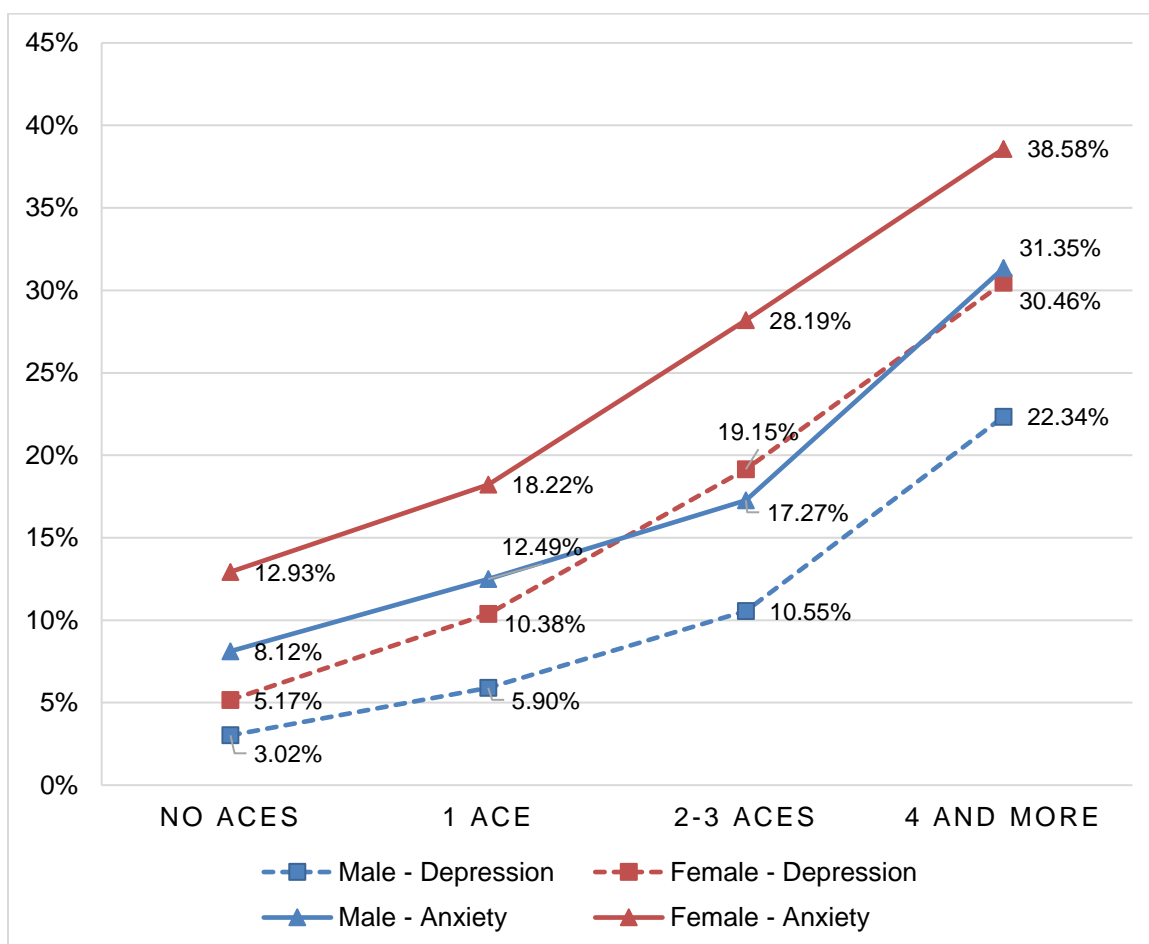


Figure 4-1: Prevalence of Anxiety and Depression by Sex and the Number of ACEs

Bivariate Correlations

I conducted Pearson's bivariate correlation analyses were separately for male and female adolescents among key research variables to identify between-variable relationships overall and potentially different patterns in the bivariate correlations across sex. The magnitude of the correlation coefficients for male adolescents ranged from $-.34$ to $.52$ and for female adolescents from $-.37$ to $.57$. Cumulative ACEs scores showed weak and significant relationships with all moderating variables in the family and

community systems, such as family resilience ($r = -.14$ for boys and $-.16$ for girls), parental aggravation ($r = .21$ for both boys and girls), and community activities ($r = -.19$ for both boys and girls), and neighborhood support ($r = -.24$ for both boys and girls). Cumulative ACEs were also positively correlated to anxiety ($r = .20$ for both boys and girls) and depression ($r = .22$ for boys and $.25$ for girls). Anxiety presented weak but significant correlation coefficients with all moderators from the family and community systems, which are family resilience ($r = -.11$ for boys and $-.12$ for girls), parental aggravation ($r = .31$ for boys and $.30$ for girls), and community activities ($r = -.14$ for both boys and girls), and neighborhood support ($r = -.09$ for boys and $-.10$ for girls). Depression also showed weak and significant correlation coefficients with family resilience ($r = -.11$ for boys and $-.15$ for girls), parental aggravation ($r = .29$ for boys and $.31$ for girls), and community activities ($r = -.13$ for boys and $-.15$ for girls), and neighborhood support ($r = -.08$ for boys and $-.11$ for girls). Parental aggravation has shown the strongest relationships with both anxiety and depression out of family and community factors.

Sex differences were found in some correlative relationships. Age was significantly and positively associated with both anxiety and depression for girls ($r = .11$, $p < .001$ for both), while age had no association with anxiety for boys ($r = .01$, $p = .130$). Age also showed a significant positive correlation ($r = .03$, $p < .001$) for girls but no association for boys ($r = .00$, $p = .762$). Minor differences were also identified across other bivariate correlation coefficients between male and female adolescents. Table 4-2 shows a summary of bivariate correlation analyses for male and female adolescents.

Table 4-2: Bivariate Correlation Analyses for Male (Below Diagonal) and Female Adolescents (Above Diagonal)

	1	2	3	4	5	6	7	8
1. Age	-	.04***	-.04***	.03**	-.09***	-.01	.11***	.11***
2. ACEs	.04***	-	-.16***	.21***	-.19***	-.24***	.20***	.25***
3. FR	-.04***	-.14***	-	-.37***	.10***	.26***	-.12***	-.15***
4. PA	.00	.21***	-.34***	-	-.14***	-.17***	.30***	.31***
5. CA	-.09***	-.19***	.10***	-.12***	-	.16***	-.14***	-.15***
6. NS	.00	-.24***	.25***	-.17***	.18***	-	-.10***	-.11***
7. Anxiety	.01	.20***	-.11***	.31***	-.14***	-.09***	-	.57***
8. Depression	.07***	.22***	-.11***	.29***	-.13***	-.08***	.52***	-

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support.

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

Hierarchical Binary Logistic Regression Models

Two sets of hierarchical binary logistic regression models were conducted for anxiety and depression, respectively, based on the 23,242 U.S. adolescent sample. In both sets of models, Model 1 included control variables, including age, race/ethnicity, and highest adult education level, to hold the potential impacts of those control variables in the following models. Model 2 added the ACEs sum score. Model 3 added five moderating variables, such as family resilience, parental aggravation, community activities, neighborhood support and sex. Model 4 added five two-way interaction terms between ACEs sum score and five aforementioned moderating variables. Model 5, which is the final model, has further included four three-way interaction terms additionally.

RQ 1. Relationship between Cumulative ACEs and Anxiety/Depression

The first research question was to identify the relationship between cumulative ACEs and adolescent anxiety and depression. In the logistic regression models for anxiety, results showed that cumulative ACEs were significantly associated with anxiety (OR = 1.40), after controlling for the sociodemographic covariates, age, race/ethnicity, and highest parental education level (see Model 2). The result of Model 1 indicated that sociodemographic covariates, such as age, race/ethnicity, and adult education, were associated with anxiety. Age (OR = 1.11) had a significant association with anxiety. Specifically, adolescents who are older were more likely to have anxiety. Regarding race/ethnicity, White participants were more likely to have anxiety than Hispanic (OR = .78), Black (OR = .52), or Asian (OR = .30), but not other races or multiracial groups. When the highest adult education in the household was college or technical school (OR = 1.49) and college or higher education (OR = 1.32), adolescents were more likely to have anxiety, compared to less than high school. In sum, Hypothesis 1.1 was supported, consistent to the existing literature, because of the cumulative effects of ACEs.

The result of the logistic regression models for depression indicated that cumulative ACEs scores were significantly related to adolescent depression (OR = 1.53), after controlling for the aforementioned sociodemographic characteristics (see Model 2). The beta coefficient of cumulative ACEs was stronger for depression ($b = .42, p < .001$) than anxiety ($b = .33, p < .001$). In terms of the correlates between depression and covariates in Model 1, the results indicated age and race were statistically significant in explaining the variance of depression. More specifically, age (OR = 1.22) was

significantly associated, such that higher age was associated with the higher probability to have depression, and this odd ratio was higher than that for anxiety. In terms of race/ethnicity, White participants were more likely to have depression than Black (OR = .74) or Asian (OR = .43), but not Hispanic and others/multiracial groups. The highest adult education level was not significantly associated with depression in Models 1-2, but it showed significant associations with depression in Models 3-5, with technical school (OR = 1.46) and college/university (OR = 1.46 ~ 1.47) showing greater risks for depression. In conclusion, Hypothesis 1.2 was also supported, confirming a dose-response relationship between cumulative ACEs and depression, even after controlling for adolescent's age, race/ethnicity, and parental highest education level.

RQ 2. Moderating Roles of Family and Community Variables

The second research question examined how selected moderators impact the relationship between cumulative ACEs and anxiety/depression of adolescents. With regard to adolescent anxiety, the result of Model 3 indicated that all moderating variables, except family resilience, were significantly associated with the outcome variable, anxiety condition (family resilience: OR = 1.06; parental aggravation: OR = 2.62; community activities: OR = .77; neighborhood support: OR = .88; sex: OR = 2.00). More specifically, adolescents were more likely to currently have anxiety when they had higher parental aggravation, lower community activities, lower neighbor support perceived by caregivers, and when they are girls. Out of five interaction terms between ACEs sum scores and five moderators, interactions between ACEs and parental aggravation and

ACEs and community activities, were statistically significant at predicting adolescent anxiety in Model 4. Parental aggravation and community activities moderated the relationship between cumulative ACEs and anxiety, but not family resilience or neighborhood support.

The result of Model 3 indicated that parental aggravation and community activities were statistically significantly associated with depression (parental aggravation: OR = 3.00; community activities: OR = .74), while family resilience and neighborhood support were not significantly associated with depression (family resilience: OR = .96; neighborhood support: OR = .88). In sum, adolescents were more likely to have depression when they their caregivers reported higher parental aggravation and lower involvement in adolescent community activities. Sex also showed a significant association with depression (OR = 2.23), with girls showing greater risk of having depression compared to boys. Two-way interaction terms in the models for depression presented similar patterns as anxiety, such that interaction terms including ACEs and parental aggravation and ACEs and community activities were statistically significant in predicting adolescent depression in Model 4. Namely, parental aggravation and community activities moderated the relationship between cumulative ACEs and depression, and other two-way interaction terms with family resilience and neighborhood support were not statistically significant. These results partially supported Hypothesis 2.1 and 2.2, in that family and community variables moderated the impact of ACEs on adolescent anxiety and depression.

RQ 3. Three-way Interaction of Sex

The third research question tested whether sex impacted the two-way interaction effect of cumulative ACEs and moderating variables on adolescent anxiety and depression. In the logistic regression models for anxiety, the three-way interactions among ACEs, family resilience, and sex, and ACEs, parental aggravation, and sex were statistically significant at $p < .05$ in Model 5. Other three-way interaction terms were not significant in association with anxiety. The results indicate that the interaction effect of ACEs and parental aggravation in predicting adolescent anxiety differs by sex.

Regarding three-way interaction terms for depression, no three-way interaction of ACEs, moderators, and sex were statistically significant in Model 5. Results suggest that sex did not impact the two-way interaction of ACEs and moderators on depression, which was not consistent with the result for anxiety. Tables 4-3 and 4-4 summarize the result of the hierarchical binary logistic regression models predicting adolescent anxiety and depression.

Table 4-3: Hierarchical Binary Logistic Regression Models Predicting Adolescent Anxiety (n = 23,242)

Predictive Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
	<i>B</i>	OR	<i>B</i>	OR	<i>B</i>	OR	<i>B</i>	OR	<i>B</i>	OR
Age	.11***	1.11	.10***	1.10	.09***	1.10	.09***	1.10	.09***	1.10
Race ^a										
Hispanic	-.25***	.78	-.33***	.72	-.42***	.66	-.42***	.66	-.42***	.66
Black	-.66***	.52	-.85***	.43	-1.03***	.36	-1.02***	.36	-1.02***	.36
Asian	-1.20***	.30	-1.09***	.34	-1.32***	.27	-1.32***	.27	-1.32***	.27
Others/Multiracial	-.06	.94	-.31***	.73	-.39***	.68	-.40***	.67	-.39***	.68
Adult Education ^b										
High school	.25	1.28	.21	1.24	.33*	1.39	.33*	1.39	.33*	1.38
Technical school	.40**	1.49	.40**	1.49	.52**	1.68	.51**	1.67	.51**	1.66

College or higher	.32*	1.37	.54***	1.71	.70***	2.02	.71***	2.03	.71***	2.02
ACE Sum			.33***	1.40	.23***	1.26	.32***	1.38	-.03	.97
FR					.06	1.06	.04	1.04	.04	1.04
PA					.96***	2.62	1.04***	2.84	1.05***	2.84
CA					-.26***	.77	-.32***	.73	-.32***	.73
NS					-.13***	.88	-.13**	.88	-.13**	.88
Sex ^c					.69***	2.00	.76***	2.13	.75***	2.12
ACEs*FR							.01	1.01	.09†	1.10
ACEs*PA							-.06***	.95	.02	1.02
ACEs*CA							.04***	1.04	.00	1.00
ACEs*NS							.01	1.01	.00	1.00
ACEs*S							-.05†	.96	.19	1.21
ACEs*FR*S									-.06*	.95
ACEs*PA*S									-.05*	.95
ACEs*CA*S									.03	1.03
ACEs*NS*S									.01	1.01
Log-Likelihood		19609.98		18785.35		16897.70		16862.83		16854.49
Pseudo R ² ^d		.02		.08		.21		.22		.22

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support, S: sex

^a Reference group: White, non-Hispanic

^b Reference group: Less than high school

^c Reference group: Male

^d Nagelkerke's R²

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$

Table 4-4: Hierarchical Binary Logistic Regression Models Predicting Adolescent Depression (n = 23,242)

Predictive Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	OR	B	OR	B	OR	B	OR	B	OR
Age	.20***	1.22	.19***	1.21	.19***	1.21	.19***	1.21	.19***	1.21
Race ^a										
Hispanic	-.15†	.85	-.26**	.77	-.32***	.72	-.32***	.73	-.32***	.73
Black	-.30**	.74	-.53***	.59	-.68***	.51	-.66***	.52	-.66***	.52
Asian	-.85***	.43	-.68***	.51	-.93***	.40	-.94***	.39	-.94***	.39
Others/Multiracial	.02	1.02	-.35***	.70	-.43***	.65	-.44***	.65	-.44***	.65
Adult Education ^b										
High school	.17	1.18	.18	1.12	.24	1.27	.23	1.26	.23	1.26
Technical school	.27†	1.31	.26	1.30	.38*	1.46	.38*	1.46	.38*	1.46
College or higher	-.03	.98	.26	1.30	.38*	1.46	.39*	1.47	.39*	1.47
ACE Sum			.42***	1.53	.31***	1.37	.48***	1.62	.29	1.33
FR					-.04	.96	-.05	.95	-.05	.95
PA					1.10***	3.00	1.26***	3.51	1.26***	3.51

CA						
NS						
Sex ^c						
ACEs*FR						
ACEs*PA						
ACEs*CA						
ACEs*NS						
ACEs*S						
ACEs*FR*S						
ACEs*PA*S						
ACEs*CA*S						
ACEs*NS*S						
Log-Likelihood	13155.48	12204.75	10593.66	10552.80	1055.1.69	
Pseudo R ² ^d	.03	.12	.26	.27	.27	

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support, S: sex

a Reference group: White, non-Hispanic

b Reference group: Less than high school

c Reference group: Male

d Nagelkerke's R²

*** p < .001, ** p < .01, * p < .05, † p < .10

Post-Hoc Analyses

Due to the complexity of the interpretation for three-way interaction terms in the research question 3, further hierarchical binary logistic regression analyses were added to the study to determine the extent to which family and community variables moderated the impact of cumulative ACEs on anxiety and depression by sex. Four hierarchical binary logistic regression models were conducted for the post-hoc analyses: 1) for anxiety among boys, 2) for anxiety among girls, 3) for depression among boys, and 4) for anxiety among girls. Results of the post-hoc analyses for anxiety showed that only parental aggravation served as a significant moderator for boys while parental aggravation and community activities were significant moderators for girls. For depression, the opposite pattern appeared between adolescent boys and girls. Both parental aggravation and

community activities significantly moderated the association between cumulative ACEs and depression among adolescent boys, whereas only parental aggravation was a significant moderator among adolescent girls. Tables 4-5 through 4-8 summarize the results of the hierarchical binary logistic regression models predicting adolescent anxiety and depression by sex.

Table 4-5: Hierarchical Binary Logistic Regression Models Predicting Anxiety among Adolescent Boys (n = 12,956)

Predictive Variables	Model 1		Model 2		Model 3		Model 4	
	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)
Age	.09 (.06)	1.09 (.98-1.21)	.05 (.06)	1.05 (.94-1.17)	.01 (.06)	1.01 (.90-1.17)	.01 (.06)	1.01 (.89-1.13)
Race ^a								
Hispanic	-.36*** (.10)	.70 (.57-.85)	-.45*** (.10)	.64 (.52-.78)	-.57*** (.11)	.57 (.46-.70)	-.56*** (.11)	.57 (.47-.71)
Black	-.48*** (.13)	.62 (.48-.80)	-.65*** (.13)	.53 (.40-.68)	-.83*** (.14)	.44 (.33-.57)	-.82*** (.14)	.44 (.33-.58)
Asian	1.51*** (.24)	.22 (.14-.35)	1.35*** (.24)	.26 (.16-.42)	1.60*** (.25)	.20 (.12-.33)	1.59*** (.25)	.20 (.12-.34)
Others/Multiracial	-.09 (.11)	.91 (.73-1.14)	-.33** (.12)	.72 (.57-.91)	-.37** (.12)	.69 (.54-.88)	-.39** (.12)	.68 (.54-.86)
Adult Education ^b								
High school	.03 (.21)	1.03 (.68-1.56)	.00 (.21)	1.00 (.66-1.53)	.07 (.23)	1.07 (.68-1.67)	.07 (.23)	1.07 (.69-1.67)
Technical school	.26 (.20)	1.29 (.87-1.92)	.26 (.21)	1.30 (.87-1.96)	.34 (.22)	1.40 (.91-2.15)	.35 (.22)	1.41 (.92-2.17)
College or higher	.14 (.20)	1.15 (.78-1.70)	.39 [†] (.20)	1.42 (1.37-1.47)	.53* (.22)	1.69 (1.11-2.59)	.53* (.22)	1.71 (1.12-2.60)
ACE Sum			.35*** (.02)	1.42 (1.37-1.47)	.24*** (.02)	1.26 (1.22-1.31)	.18 (.13)	1.20 (.93-1.54)
FR					.06 (.05)	1.06 (.96-1.18)	.03 (.07)	.98 (.85-1.12)
PA					1.04*** (.04)	2.82 (2.61-3.05)	1.12*** (.05)	3.06 (2.76-3.40)
CA					-.30*** (.03)	.74 (.70-.79)	-.33*** (.04)	.72 (.66-.78)
NS					-.12** (.05)	.89 (.81-.97)	-.12 [†] (.07)	.89 (.79-1.01)
ACEs*FR							.05 [†] (.03)	1.05 (.99-1.11)
ACEs*PA							-.06** (.02)	.95 (.91-.99)

ACEs*CA				.03 (.02)	1.03 (.99-1.06)
ACEs*NS				-.00 (.03)	1.00 (.95-1.05)
Log-Likelihood	8983.62	.8566.52	7619.10	.7602.20	
Pseudo R ² ^d	.02	.08	.21	.22	

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support

a Reference group: White, non-Hispanic

b Reference group: Less than high school

c Reference group: Male

d Nagelkerke's R²

*** p < .001, ** p < .01, * p < .05, † p < .10

Table 4-6: Hierarchical Binary Logistic Regression Models Predicting Anxiety among Adolescent Girls (n = 11,861)

Predictive Variables	Model 1		Model 2		Model 3		Model 4	
	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)
Age	.55*** (.05)	1.73 (1.56-1.91)	.54*** (.05)	1.71 (1.54-1.90)	.53*** (.06)	1.69 (1.52-1.88)	.53*** (.06)	1.69 (1.52-1.88)
Race ^a								
Hispanic	-.19* (.08)	.83 (.71-.98)	-.28** (.09)	.76 (.64-.90)	-.32*** (.09)	.73 (.61-.87)	-.32*** (.09)	.72 (.61-.86)
Black	-.83*** (.13)	.44 (.34-.56)	1.04*** (.13)	.35 (.27-.46)	1.20*** (.14)	.30 (.23-.40)	1.20*** (.14)	.30 (.23-.40)
Asian	1.09*** (.16)	.34 (.25-.46)	1.03*** (.16)	.36 (.26-.49)	1.16*** (.17)	.31 (.23-.43)	1.17*** (.17)	.31 (.22-.43)
Others/Multiracial	-.06 (.10)	.94 (.78-1.14)	-.34** (.10)	.71 (.59-.87)	-.40*** (.11)	.67 (.54-.82)	-.41*** (.11)	.67 (.54-.82)
Adult Education ^b								
High school	.46* (.20)	1.58 (1.08-2.32)	.42* (.20)	1.53 (1.03-2.26)	.56** (.21)	1.76 (1.17-2.64)	.55** (.21)	1.74 (1.16-2.60)
Technical school	.53** (.19)	1.70 (1.17-2.47)	.53** (.20)	1.70 (1.16-2.49)	.67** (.20)	1.96 (1.32-2.90)	.65** (.20)	1.92 (1.30-2.84)
College or higher	.47* (.19)	1.60 (1.11-2.31)	.33* (.19)	1.99 (1.37-2.90)	.87*** (.20)	2.38 (1.61-3.52)	.87*** (.20)	2.39 (1.62-3.52)
ACE Sum			.33*** (.02)	1.39 (1.34-1.43)	.22*** (.02)	1.25 (1.21-1.30)	.32** (.12)	1.38 (1.09-1.75)
FR					.03 (.05)	1.03 (.94-1.13)	.08 (.06)	1.08 (.95-1.22)
PA					.89*** (.04)	2.43 (2.25-2.62)	.97*** (.05)	2.65 (2.40-2.92)
CA					-.24*** (.03)	.79 (.75-.83)	-.32*** (.04)	.73 (.68-.78)
NS					-.13** (.04)	.88 (.81-.95)	-.15** (.06)	.87 (.78-.97)

ACEs*FR				-.03 (.03)	.97 (.92-1.02)
ACEs*PA				-.06** (.02)	.95 (.01-.99)
ACEs*CA				.06*** (.02)	1.06 (1.03-1.09)
ACEs*NS				.01 (.02)	1.01 (.07-1.05)
Log-Likelihood	10415.76	9994.02	9223.32	9200.69	
Pseudo R^2 ^d	.03	.08	.20	.20	

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support

a Reference group: White, non-Hispanic

b Reference group: Less than high school

c Reference group: Male

d Nagelkerke's R^2

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$

Table 4-7: Hierarchical Binary Logistic Regression Models Predicting Depression among Adolescent Boys (n = 12,956)

Predictive Variables	Model 1		Model 2		Model 3		Model 4	
	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)
Age	.52*** (.08)	1.68 (1.44-1.96)	.49*** (.08)	1.64 (1.40-1.92)	.48*** (.09)	1.62 (1.37-1.91)	.48*** (.09)	1.62 (1.37-1.91)
Race ^a								
Hispanic	-.13 (.13)	.88 (.69-1.12)	-.22 (.13)	.80 (.62-1.03)	-.32* (.14)	.73 (.56-.95)	-.31* (.14)	0.74 (.56-.96)
Black	-.22 (.16)	.81 (.59-1.10)	-.40* (.17)	.67 (.48-.92)	-.58** (.18)	.56 (.40-.79)	-.56** (.17)	.57 (.41-.80)
Asian	1.04*** (.28)	.35 (.20-.62)	-.79** (.29)	.45 (.26-.79)	1.07*** (.31)	.34 (.19-.62)	1.05** (.30)	.35 (.19-.64)
Others/Multiracial	-.17 (.16)	.85 (.62-1.15)	-.50** (.16)	.61 (.44-.84)	-.51** (.17)	.60 (.43-.84)	-.53** (.17)	.59 (.42-.82)
Adult Education ^b								
High school	.26 (.27)	1.30 (.76-2.20)	.21 (.28)	1.24 (.72-2.13)	.24 (.29)	1.27 (.72-2.25)	.24 (.29)	1.27 (.72-2.24)
Technical school	.35 (.26)	1.42 (.85-2.37)	.33 (.27)	1.39 (.82-2.36)	.35 (.28)	1.42 (.82-2.48)	.37 (.28)	1.44 (.82-2.45)
College or higher	-.01 (.26)	.99 (.59-1.65)	.29 (.27)	1.34 (.80-2.26)	.34 (.28)	1.41 (.81-2.45)	.35 (.28)	1.42 (.82-2.35)
ACE Sum			.44*** (.02)	1.55 (1.49-1.61)	.32*** (.02)	1.37 (1.31-1.43)	.55*** (.15)	1.74 (1.29-2.35)
FR					-.02 (.07)	.99 (.86-1.13)	-.03 (.01)	.97 (.80-1.12)
PA					1.14*** (.05)	3.14 (2.84-3.47)	1.34*** (.07)	3.82 (3.32-4.40)

CA					-.34 (.04)	.71 (.65-.77)	-.43*** (.06)	..65 (.58-.73)
NS					.03 (.06)	1.03 (.92-1.17)	-.02 (.03)	.98 (.92-1.04)
ACEs*FR							.01 (.03)	1.01 (.95-1.08)
ACEs*PA							-.11*** (.03)	.90 (.86-.94)
ACEs*CA							.05* (.02)	1.05 (1.01-1.10)
ACEs*NS							-.02 (.03)	.98 (.92-1.04)
Log-Likelihood	5700.24	5266.64	4564.08	4537.70				
Pseudo R^2 ^d	.02	.11	.25	.26				

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support

a Reference group: White, non-Hispanic

b Reference group: Less than high school

c Reference group: Male

d Nagelkerke's R^2

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$

Table 4-8: Hierarchical Binary Logistic Regression Models Predicting Depression among Adolescent Girls (n = 11,861)

Predictive Variables	Model 1		Model 2		Model 3		Model 4	
	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)	<i>B</i> (SE)	OR (95% CI)
Age	.68*** (.07)	1.97 (1.73-2.25)	.68*** (.07)	1.97 (1.72-2.25)	.67*** (.07)	1.96 (1.70-2.26)	.67*** (.07)	1.95 (1.69-2.25)
Race ^a								
Hispanic	-.19 (.11)	.82 (.67-1.01)	-.32** (.11)	.73 (.59-.90)	-.34** (.12)	.71 (.57-.89)	-.35** (.11)	.71 (.57-.89)
Black	-.35* (.14)	.70 (.53-.93)	-.61*** (.15)	.54 (.41-.73)	-.75*** (.16)	.47 (.35-.65)	-.73*** (.16)	.42 (.29-.63)
Asian	-.79*** (.19)	.45 (.31-.66)	-.69*** (.19)	.50 (.34-.73)	-.84*** (.20)	.43 (.29-.64)	-.86*** (.20)	.43 (.29-.64)
Others/Multiracial	-.10 (.12)	1.10 (.88-1.39)	-.31* (.13)	.74 (.58-.94)	-.39** (.13)	.68 (.52-.88)	-.39** (.13)	.68 (.52-.88)
Adult Education ^b								
High school	.14 (.22)	1.15 (.76-1.76)	.14 (.22)	1.15 (.76-1.76)	.25 (.23)	1.28 (.81-2.03)	.24 (.23)	1.27 (.81-2.00)
Technical school	.24 (.21)	1.27 (.85-1.92)	.24 (.21)	1.27 (.85-1.92)	.39† (.28)	1.48 (.95-2.31)	.38† (.22)	1.47 (.94-2.28)
College or higher	-.04 (.21)	.97 (.65-1.44)	-.04 (.21)	.97 (.65-1.44)	.42† (.23)	1.52 (.98-2.37)	.43† (.22)	1.54 (.99-2.37)
ACE Sum			.42*** (.02)	1.52 (1.47-1.58)	.31*** (.02)	1.36 (1.31-1.41)	.34*** (.14)	1.40 (1.07-1.83)

FR					
PA					
CA					
NS					
ACEs*FR					
ACEs*PA					
ACEs*CA					
ACEs*NS					
Log-Likelihood	5700.24	6824.95	6048.20	6029.80	
Pseudo R^2 ^d	.03	.12	.25	.25	

Note. FR: family resilience, PA: parental aggravation, CA: community activities, NS: neighborhood support

a Reference group: White, non-Hispanic

b Reference group: Less than high school

c Reference group: Male

d Nagelkerke's R^2

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$

Summary of the Results

This chapter described the results of the preliminary analyses, descriptive statistics, and primary analyses, which were two different sets of hierarchical binary logistic regression models for 12-17 aged adolescent anxiety and depression, by using nationally representative data. Missing values for each variable ranged from .00% to 3.52%. The listwise deletion method was adopted to deal with missing data, which resulted in 23,242 cases as the final analytic sample after deleting 6.35% of the initial sample ($n = 24,817$). Descriptive findings from Chi-square tests, independent t-tests, and bivariate correlation analyses suggested statistically significant relationships between

research variables. More specifically, the prevalence of adolescent anxiety and depression were found different by sex and cumulative ACEs.

Results of hierarchical binary logistic regression models demonstrated that predictive variables in the models presented similarities and differences across anxiety and depression in terms of their statistical significance. Both sets of models revealed that cumulative ACEs were significantly associated with outcome variables (OR = 1.40 for anxiety; OR = 1.53 for depression). Among moderating variables, including family resilience, parental aggravation, community activities, and neighborhood support, parental aggravation and community activities significantly moderated the relationship between ACEs and both outcome variables, anxiety and depression. Concerning the three-way interaction, interactions among ACEs, family resilience, and sex (i.e., ACEs*family resilience*sex) and ACEs, parental aggravation, and sex (i.e., ACEs*parental aggravation*sex) were significant in the model predicting anxiety. In contrast, no three-way interaction term was statistically significant in the model for depression.

Post-hoc analyses revealed moderating roles of parental aggravation and community activities differed by sex (i.e. boys and girls) and mental health outcomes (i.e., anxiety and depression). Parental aggravation was consistently found significant as a moderator, while participation in community activities was a significant moderator when a case was for anxiety among girls and depression among boys.

Chapter 5

Discussion

The purpose of this study was to examine the moderating variables from the family and community systems in the relationships between ACEs and anxiety/depression among adolescents in the U.S. for controlling sociodemographic characteristics, such as age, race/ethnicity, and adult education, using a sample of the 2018-2019 NSCH data. More specifically, this study first aimed to identify the relationship between cumulative ACEs scores and adolescent anxiety/depression and further examine the moderating roles of family resilience, parental aggravation, community activities, and neighborhood support by conducting hierarchical binary logistic regression models. Two different sets of hierarchical binary logistic regression models were separately implemented for anxiety and depression in order to identify potentially distinctive impacts of independent and moderating variables on anxiety and depression. Additionally, three-way interaction terms, comprising sex, cumulative ACEs, and moderating variables from the family and community systems, were included to find out whether sex impact the two-way interaction effects of cumulative ACEs and other moderating variables.

Results from the current research provide support for social-ecological risk and protective factors model. Findings are consistent with previous research in that positive relations were found between cumulative ACEs and anxiety/depression among diverse adolescent populations (Balistreri & Alvira-Hammond, 2016; Bethell et al., 2016; Bielas et al., 2016; Kim et al., 2021; Lee et al., 2020; Matsuura et al., 2013). The more

adolescents experience childhood adversities the greater the risks for experiencing anxiety and depression, which supports a dose-response relationship between ACEs and increased risks for negative mental health outcomes that previous studies documented (e.g., Chapman et al., 2004; Felitti et al., 1998). The current study's finding also included the roles of moderating variables, where lower parental aggravation and higher participation in organized community activities buffered the negative impacts of ACEs on the development of anxiety and depression. Although not every two-way interaction was significant, the pattern of findings was consistent for anxiety and depression. Two three-way interaction terms including family resilience and parental aggravation were significant for only anxiety and not depression, potentially revealing the role of sex in explaining the complex interplay among family and community systems as social-ecological risk and protective factors, and sex.

These findings allow for a better understanding of the most effective interventions by sex and mental health symptoms (i.e., anxiety and depression) as well as ACEs-informed counseling practice and counselor training. Moreover, these findings may benefit counseling professionals, counseling researchers, counselor educators, and policymakers by enhancing what we know related to appropriate service delivery, maximizing the use of family and community systems surrounding adolescents with anxiety and depression symptoms.

Discussion of the Findings

Descriptive Findings

Descriptive statistics showed several notable findings from a lens of social-ecological protective and risk factors framework. Descriptive findings partially presented significant interplay among ACEs (risk factors), family and community variables (risk and protective factors), sex (individual factor) with anxiety/depression (mental health outcomes) after controlling sociodemographic variables (individual factors). Findings provide support for the social-ecological risk and protective factors framework by demonstrating statistically significant relationships between sociodemographic variables, risk and protective factors from family and community systems, and mental health outcomes, such as anxiety and depression, among U.S. adolescents.

An interesting finding was that statistically significant mean differences between boys and girls were found in parental aggravation and community activities. Male adolescents were perceived to experience higher parental aggravation than female adolescents, which may put male adolescents at greater risk for mental health concerns. Female adolescents were more likely to participate in organized community activities than male adolescents, which may protect female adolescents from developing mental health problems.

Levels of family resilience and neighborhood support perceived by caregivers did not show any significant mean differences between adolescent boys and girls. On the other hand, descriptive findings indicated that girls reported higher engagement in community activities, including sports teams, clubs, and other organized activities, such

as music, dance, and language or other arts. This sex difference is notable given that there is good evidence that participation in such organized activities is associated with positive youth development (Barber et al., 2001; Bohnert et al., 2007; Fraser-Thomas et al., 2005; Fredricks & Simpkins, 2013; Oosterhoff et al., 2017; Wright et al., 2019). For example, participation in organized community activities was related to youth's positive peer process (Fredricks & Simpkins, 2013) and higher self-esteem and social support (Oosterhoff et al., 2017). Regarding the prevalence of anxiety and depression, 12-17 aged adolescent girls showed higher prevalence for both conditions compared to boys, which is congruent with a recent past study's findings (Kim et al., 2020). This result is meaningful because it supports the result of the previous research, based on one of the most recently collected national adolescent sample in the U.S., 2018-2019 NSCH. The result of bivariate correlation analyses also supported that cumulative ACEs were significantly associated with family and community factors. In sum, descriptive findings are well aligned with assumptions of the current study's theoretical framework (e.g., "interactions between risk and protective factors can occur even at the same system, contributing the prevention or development of mental health problems").

RQ1. Relationship between Cumulative ACEs and Anxiety/Depression

The first research question examined the relationships between cumulative ACEs and anxiety/depression among 12-17 aged U.S. adolescents. The research findings supported the hypotheses that cumulative ACEs would be positively associated with both anxiety and depression among adolescents, which is congruent with the existing

literature. As outlined in the Literature Review, it is well documented that cumulative ACEs can have critical impacts on the development of numerous mental health problems, including anxiety and depression, among various age groups (Bethell et al., 2014; Moore & Ramirez, 2016). A handful of existing studies also evidenced the relationship for adolescent populations (Elmore & Crouch, 2020; Kim et al., 2021; Lee et al., 2020). This study's findings reconfirmed the close associations between cumulative ACEs and adolescent anxiety/depression after controlling sociodemographic characteristics, such as age, race/ethnicity, and highest parental education level. The impact of cumulative ACEs was found slightly stronger for depression (OR= 1.53) compared to anxiety (OR = 1.40) among adolescents, also consistent with previous studies (e.g., Kim et al., 2020).

The learned helplessness model (Maier & Seligman, 1976) may be one avenue to explain the mechanism about how past adverse events in childhood affects current mental health, particularly for depression. Learned helplessness refers to the motivational, cognitive, and emotional deficits that may follow from an agency's exposure to uncontrollable stressors (Isaacowitz & Seligman, 2007). Within the learned helplessness framework, maladaptive schematic representations of the self, world, and future are regarded as activated by matching life experiences, which is essential in the development and maintenance of depression (Clark & Beck, 2010). The learned helplessness model posits that individuals become depressed and helpless if they experience a disconnection between their behavior and desired outcomes.

ACEs are risk factors from family and social contexts, which are commonly unavoidable, unsolvable, and uncontrollable stressors for adolescents. Considering that most ACEs occur within social and ecological contexts, such as the household and

community environment, instead of happening internally, adolescents who are faced with ACEs may come to believe that they are unable to control or affect those environmental difficulties. This belief may contribute to teens feelings of helplessness and depression. The maladaptive schematic representations of the self, world, and their future may become solidified when they find a disconnection between their endeavor to avoid or overcome ACEs and life outcomes. For example, when an adolescent strives to address the adversarial event (behavior) but fail to make any improvements or advancements in their situation (outcome), the individual may gain ‘learned helplessness’ feeling reduced sense of control. This mechanism may also explain a stronger impact of ACEs on adolescent depression compared to anxiety, given that learned helplessness plays a larger role in depression than anxiety in the literature. Miller and colleagues (1975) reported that depressed college students showed more characteristics related to learned helplessness than those with anxiety. In sum, adolescents’ mental health concerns, particularly for depression, can be partially explained by cumulative ACEs as social-ecological risk factors, via learned helplessness its leading to outcomes characterized as deprivation of perceived control in life challenges.

RQ 2. Moderating Roles of Family and Community Variables

The second research question aimed to find out whether family and community factors as well as sex moderate the relationship between ACEs and anxiety and depression, and if so, how the moderators work differently for anxiety and depression. Results provided support for the social-ecological risk and protective factors model

overall, in that both family and community were identified as having both risk factors (e.g., parental death, witnessing domestic violence, community violence) and protective factors (i.e., low parental aggravation, community activities). More specifically, One notable finding was that family resilience did not show significant relationships with anxiety and depression in Model 3 and significant moderating roles in Model 4. This finding differed from what was initially expected because previous studies suggested an important role of family resilience for youth and families with adversities (Bethell et al., 2019; Uddin et al., 2020; Walsh, 2012). Uddin and colleagues (2020) suggested the protective role of family resilience, such that the impact of ACEs is weaker among those who have higher levels of family resilience, based on the 2016-2017 NSCH data.

A few different reasons may explain this inconsistency about the role of family resilience. The validity of measuring family resilience can be one of the reasons why it did not serve as a significant predictor in the regression models. In light of the caregiver-report method of the NSCH, caregivers' responses about family resilience might have failed to capture the actual level of family resilience. More specifically, adolescents' perceived family resilience may differ from what their caregivers perceived. Family resilience in the survey was measured with only four items, which asked about talking together about what to do, working together to solve problems, knowing that we have strengths, and staying hopeful in difficult times. A more comprehensive measure of family resilience might provide different result, given that family resilience is a broad construct that includes making meaning of adversity, positive outlook, transcendence and spirituality, flexibility, connectedness, social and economic resources, clarity, open emotional expression, and collaboration problem-solving (Walsh, 2003). Also,

considering family resilience showed weak but statistically significant correlations with depression and anxiety for both adolescent boys and girls (r ranging from .11 to .15), the reason why it was not a significant predictor in the regression models may be due to other factors' influence outweighing the significance of family resilience in the regression models. For example, parental aggravation and other community factors might have offset the influence of family resilience in the regression models due to their stronger relationships with outcome variables. Further investigations should warrant the role of family resilience related to ACEs and adolescent mental health conditions, such as internalizing behaviors.

Another interesting finding was that parental aggravation appeared the most powerful moderator of family and community factors in this study. This finding is congruent with recent studies (Suh & Luthar, 2020; Uddin et al., 2020), which highlighted the crucial role of parental aggravation or parenting stress on a child's mental and behavioral health. For instance, Suh and Luthar (2020) revealed that parental aggravation showed greater effects than ACEs on children's internalizing and externalizing problems. Uddin and colleagues (2020) found out that parenting stress significantly mediated the effects of ACEs on children's mental health problems, such as anxiety and depression. Considering that both previous studies used the exact measurement from the same national data, but published in different years (i.e., 2016 – 2017 NSCH), it seems consistent that at least caregiver-reported parental aggravation is strongly associated with adolescent internalizing behaviors (i.e., anxiety and depression) and may play a critical role in the associations between ACEs and the aforementioned mental health concerns. This consistency also maybe because of the solid internal

validity of the measure, contrary to family resilience, because caregivers could precisely report their perceived stress and aggravation levels.

Aggravation in the parenting role is influenced by various factors, including availability of emotional and social support, child-parent relationship, and parental education (Murphey et al., 2014). Child's ACEs can be another critical correlate with parental aggravation. Given that household dysfunction is a large part of the ACEs, parents or caregivers are more likely experience greater stress level due to the malfunction in the household when their child report higher number of ACEs. Baumeister (2014), through the limited energy model, suggested that self-regulation depends of limited energy and depleted willpower fosters disinhibited behavior. This may indicate that when parents or caregivers have stressful events in their household, they are less likely regulate their aggravation in the communication with their children. It may be difficult for a child to feel safe and secured when the child has experienced ACEs and even their parents are easily upset with them, which may serve as an avenue to develop internalizing symptoms. Parents with depleted energy because of other life stresses would more struggle with providing emotional support with their child who experience emotional and cognitive disturbance under stressful situations. This lack of emotional support from caregivers may contribute to the development internalizing problems, such as anxiety and depression, because internalizing disorders is characterized problems that are based overcontrolled symptoms for inappropriate regulation of their internal emotional and cognitive state (Cicchetti & Toth, 1991). In sum, children may develop internalizing patterns inhibiting their emotions and thoughts when ACEs bring stress to the entire household and parents may not support and accept their emotions.

Support for caregiver's emotional burden to reduce parental aggravation may decrease the risk of child's internalizing symptoms.

Interpretation should be carefully considered about the result of parental aggravation because the relationship between parental aggravation and adolescent anxiety/depression may be bidirectional. I assumed in this study that parental aggravation, or parents' struggles in dealing with parenting-related distress and emotional burden, was predictive of adolescent anxiety and depression. However, the opposite direction may also make sense, such that caregivers feel greater aggravation and distress when their child has mental health problems. A line of research studies supported the latter direction, which suggested that caregivers might experience greater levels of parenting stress and increased risks of serious health concerns, such as anxiety and depression, when their child have anxiety disorders (Hughes et al., 2009), developmental disability (Hastings, 2002), autism or autistic spectrum disorders (Rivard et al., 2014; Weiss, 2002). This is because raising a child with those mental and developmental conditions would be more demanding in daily lives in comparison to raising children without any condition. Therefore, it is recommended to interpret the current study's result carefully, and more investigations are needed to establish clearer links between ACEs, parental aggravation, and a child's mental health problems.

Findings also indicated that engagement in organized community activities served as a protective factor against the effects of cumulative ACEs on both anxiety and depression. Despite the strong evidence in the role of organized activities for positive youth development (Barber et al., 2001; Bohnert et al., 2007; Fraser-Thomas et al., 2005; Wright et al., 2019), studies about the protective role of extracurricular activities for

youth's internalizing and externalizing behaviors were scant and mixed in the literature (e.g., Burton & Marshall, 2005; Ruvalcaba et al., 2016). Burton and Marshall (2005), from a sample of a hundred-sixty-nine 14-15 aged Scottish adolescents, reported that participation in sports activities did not act as a protective factor for presenting aggressive behavior. Ruvalcaba and colleagues (2016) found out that adolescents who belong to artistic, sport, and/or scout social groups reported higher levels of resilience and emotional resilience than those who do not belong to any group or a different type of group, among 12-17 aged Mexican adolescents. The finding of the current study is promising that organized community activities acted as a protective factor against the adverse impacts of ACEs. A possible explanation is that adolescents with ACEs may recover from being deprived of basic human needs, such as safety, competence, autonomy, and relatedness, through these activities by expanding opportunities for a variety of social support (e.g., peer support, adult support). In conclusion, the findings support the framework of the social-ecological risk and protective factors model and highlight the potential benefits of using organized activities as avenues to increase adolescents' resilience and positive development, when they have ACEs.

RQ 3. Three-way Interaction of Sex

The third research question explored the role of sex in two-way interaction effects of cumulative ACEs and moderating variables from family and community systems, such as family resilience, parental aggravation, community activities, and neighborhood support on anxiety and depression. Table 4-3 shows, in Model 5, that three-way

interactions based on family resilience and parental aggravation were found to significantly contribute to the variance of anxiety despite their weak coefficients ($b = -.06, p < .05$ for interaction among ACEs, parental aggravation, and sex; $b = -.05, p < .05$ for interaction among ACEs, community activities, and sex), while no significant three-way interaction term was found for the variance of depression. Given that family resilience was not statistically significant as a moderator in Model 4, only parental aggravation showed meaningful and statistically significant results throughout the models for anxiety. The results indicate that sex may affect the way some family and community factors play risk and protective roles in the relationship between cumulative ACEs and developing adolescent mental health problems. Findings also indicate that the magnitude of interactions can be varied depending on different types of adolescent mental health concerns (e.g., anxiety, depression). More investigation will be needed about the role of sex and how the results would vary across other mental health outcomes in the way risk and protective factors moderate the association of ACEs and mental health outcomes.

Implications

Guided by the social-ecological risk and protective factors model, the present research provides substantial practical implications for professional counselors and other mental health professionals. Findings indicate that counselors' work with adolescents who have mental health concerns would be greatly improved by including trauma-informed, ACEs-informed, and culturally responsive care. Study findings support for the theoretical framework seems to encourage counselors to integrate social-ecological risk

and protective factor perspectives into their practice in areas such as screening, assessment, conceptualization, treatment plan, intervention, and program implementation. They support counselors developing collective goals, establishing shared work plans, building collaborative relationships across the surrounding social ecological systems of adolescents, such as school-family-community systems (Ellis & Dietz, 2017; Oshri et al., 2015; Williams & Bryan, 2013). Counselors should also pay close attention to potential links between a history of ACEs and current mental health conditions, such as anxiety and depression, based on the evidence found from this research.

Trauma-Informed Care (TIC) is an evolving approach to sensitively recognizing and addressing the prevalence and impacts of trauma within health care systems. TIC emphasizes physical, psychological, and emotional safety and creates opportunities for clients to rebuild a sense of control and empowerment. The Substance Abuse and Mental Health Services Administration (SAMHSA, 2014, p. 9) defined TIC as “A program, organization, or system that is trauma-informed realizes the widespread impact of trauma and understands potential paths for recovery; recognizes the signs and symptoms of trauma in clients, families, staff, and others involved with the system; and responds by fully integrating knowledge about trauma into policies, procedures, and practices, and seeks to actively resist retraumatization.”

TIC can benefit those both who experienced ACEs and traumatic events and who have not experienced childhood adversity and trauma, by building safety and trust as well as strengthening a collaborative relationship. Counselors who actively adopt TIC in their practical settings would intentionally avoid retraumatization, improving screening assessment processes, building a trauma-informed treatment plan, promoting resilience

over pathology, and injecting hope for recovery. SAMHSA (2014) further suggested six broad principles for TIC as follows:

1. *Safety*. Promoting a sense of physical and psychological safety for clients and their family members is a high priority throughout the service-providing organization.
2. *Trustworthiness and transparency*. Operations and decisions of the organization are conducted with transparency and trust.
3. *Peer support*. Peer support and mutual self-help are considered key resources for establishing recovery, safety, trust, collaboration, and hope. Peers may include individuals with lived experiences of trauma and household members who share the traumatic events.
4. *Collaboration and mutuality*. All members of a service-providing organization can contribute to clients' healing process in the meaningful sharing of power and decision-making.
5. *Empowerment, voice, and choice*. Strength-based and client-centered approaches are recognized and built upon the holistic understanding of clients and their traumatic experiences.
6. *Cultural, historical, and gender issues*. Prevention and intervention efforts must be culturally sensitive and free of stereotypes and biases related to multicultural dimensions, such as race, ethnicity, sexual orientation, age, religion, gender identity, etc.

The prevalence of ACEs among adolescents suggests that almost all counselors working in school or community settings will encounter adolescent clients who experienced at least one or even multiple childhood adversities. This fact indicates that it is imperative to strengthen approaches to care and research by integrating the scholarship of ACEs. More specifically, counseling scholars and practitioners could explore how ACEs-informed counseling can be effectively applied in the counseling field and how evidence-based counseling intervention can alleviate the impacts of ACEs, given that other fields, such as psychology, social work, and nursing, have begun considering the impacts of ACEs and producing implications for their own fields (Zyromski et al., 2020).

Implications for Practice

Counselors who work to provide good care to adolescents are recommended to embrace trauma-informed, sex-specific, and culturally-relevant approaches. Regarding the trauma-informed approach, service providers should consider four key assumptions: realizing the prevalence of ACEs and childhood trauma, recognizing signs of ACEs and trauma, responding with trauma-informed principles, and resisting retraumatization, outlined by SAMHSA (2014). Sex-specific care is also crucial in light of the sex differences in the key research variables in this study.

Along with the need for sex-specific care, culturally relevant practice is another essential consideration when addressing ACEs among adolescents. Bernard et al. (2021) recently proposed a Culturally-informed Adverse Childhood Experiences (ACEs) model, or “C-ACE,” responding to burgeoning literature focusing on the potentially traumatic

nature of race-based experiences for racial minority populations. This model extended the ACE framework by highlighting the significance of racism as another distinct ACE category and a determinant of post-ACEs mental health consequences for Black youth. More specifically, the C-ACE model incorporated a few additional concepts into the existing ACEs framework, such as historical trauma (e.g., intergenerational transmission of racism-related stress) and racism-informed social conditions (e.g., societal perceptions, barriers to health care). Counselors should consider the culturally-informed ACEs model to fully acknowledge adolescents' cultural identities and validate the lived experiences of marginalized adolescents from diverse backgrounds.

The findings of this study further support the literature related to the use of family and community systems in the prevention efforts of adolescents' anxiety and depression. Counseling researchers have reiterated that it is essential to build partnerships among school, family, and community to empowering school-aged children and adolescents and promoting their positive development amid life challenges (Bryan et al., 2020; Bryan & Henry, 2008; Griffin & Steen, 2010; Henry et al., 2017). From an ecological perspective, collaboration with family and community is imperative to build resilience and mitigate the impacts of ACEs for adolescents. Counselors are strongly recommended to consider family and community-level interventions to deal with adolescent mental health problems.

Counselors should integrate social justice and equity issues in their efforts to build partnerships with school, family, and community. For example, the equity-focused school-family-community partnership model emphasized collaboration among those agencies based on empowerment, democratic collaboration, social justice, and strengths-

based principles in order to help students develop resiliency despite adversity (Bryan & colleagues, 2020). They described a step-by-step partnership model, including preparing to partner, assessing needs and strengths, coming together, creating shared vision and plan, taking action, evaluating and celebrating progress, and maintaining momentum.

Taking into account parental aggravation as the strongest moderator in the relationships between ACEs and anxiety/depression, it is vital that counselors should intervene in caregiver's emotional distress and burden as part of efforts to address adolescent mental health issues. In fact, an accumulating body of evidence documented that intervention programs targeting to mitigate caregivers' parenting burden were effective in supporting caregiver's own wellbeing and their parenting (Goodman & Garber, 2017; Luthar & Ciciolla, 2015; Luthar & Eisenberg, 2017; Luthar et al., 2019). Morris et al. (2017), in their Building Early Relationships Model of Change, highlighted a critical role of parental education programs and suggested that promoting nurturing parent-child relationships can benefit psychosocial outcomes of both parents and children through two primary mechanisms: (a) strengthening parents' social support and (b) fostering positive parent-child interactions. With the considerations in mind, counselors may consider assessing caregivers' emotional experiences concerning parenting and availability of social and emotional support, in addition to the assessment for adolescent's assessment and presenting problems. Counselors should be aware that intervening in a caregiver's emotional burden in parenting can be great preventive potential for at-risk adolescents with childhood adversities.

Counselors working with adolescents and their families are also encouraged to involve adolescents in organized activities in community settings. Those organized

activities may include sports teams or lessons, clubs or organizations, and other activities and lessons, including music, dance, language, or other art classes. Participation in the aforementioned activities may increase adolescents' perceived social engagement and support, which may offset the distress that comes from adverse experiences in the family and community.

Despite the promising finding regarding community activities, this finding also may imply disparities in access to the activities by adolescent's social conditions. Considering that individual adolescents are situated under different situations in terms of family and community resources, their participation in organized activities may be affected by the social conditions. A recent study conducted by Steinberg and Simon (2019) reported that youth living in more disadvantaged contexts (e.g., lower-income families, unsafe neighborhoods) had less access to organized activities. Taken together, counselors will need to be cognizant of the fact that accessibilities to family and community resources (e.g., financial resources in the household, economic and social conditions in the community) may play a critical role in determining adolescent's and family's involvement and participation in the resources, such as organized community activities.

Implications for Training

The current study's finding provides the basis for an argument and rationale for integrating ACEs and trauma in counselor training curriculum. There is a lack of trauma education in counseling graduate programs, such that most programs do not provide a

course with a focus on trauma (Black, 2006), although the Council for Accreditation of Counseling and Related Educational Programs (CACREP, 2016) has specified standards about crises and traumas in many areas. Examples of those areas include clinical mental health counseling (5.C.2.i), clinical rehabilitation counseling (5.D.2.b), marriage, couple, and family counseling (5.F.2.e), and school counseling (5.G.2.e). Research also indicated the lack of trauma-related training in addressing client's experience of child abuse (Kenny & Abreu, 2015). Responding to the need for counselor preparation in trauma counseling, a growing number of counseling practitioners and researchers have been recognizing the importance of integrating education about ACEs and trauma into the counselor training process. For example, Chatters and Liu (2020) called for more attention and intentional efforts to incorporate trauma education in counseling program curricula. They further suggested specific strategies of integrating trauma education in curriculum, such as introducing specialized knowledge for different types of trauma, incorporating education of neurobiology of trauma, providing a review of evidence-based trauma treatments, and addressing self-care and vicarious trauma. In sum, counselor training programs would benefit from responding to the charge to provide training related to ACEs and trauma. Counselors could then be expected to become more competent and confident in providing culturally relevant and trauma-informed practices to traumatized adolescents with multiple ACEs, who have elevated risks for anxiety and depression.

Findings of this study also provide support for emphasizing importance of fully recognizing risk and protective factors in adolescent's social and ecological contexts in preparation of counseling trainees. Counselor training programs ought to support trainees implementation of family and community involved interventions and programs as well as

culturally sensitive ones. CACREP Standards (2016) also acknowledge the importance of cultural and environmental considerations in assessment and treatment. They stress the role of family, social networks, and community systems in the provision of counseling services. Counselor educators are therefore encouraged to promote client understanding of and access to a variety of community-based resources as well as be well-equipped with strategies to engage the family and caregivers of at-risk adolescents.

Implications for Research

Most research studies in counseling literature have documented individual childhood adversity's prevalence, impacts, risk and protective factors. Those past studies have explored issues, qualitatively, quantitatively, and conceptually, around social and ecological risk and protective factors in youth with incarcerated parents (e.g., Warren et al., 2019) or divorced parents (e.g., Whitten & Burt, 2015), youth who experienced the loss of a parent (e.g., Howarth, 2011), interpersonal maltreatment (Lawson, 2009), social isolation by peer and adult abuse (e.g., Hazler & Denham, 2002), peer victimization (e.g., Carney et al., 2020), and survivors of sexual abuse and trauma (e.g., Barnum et al., 2017; Foster & Hagedorn, 2013). What is missing in the existing counseling literature is the explicit connection between conceptualization of the individual childhood adversities and literature of ACEs (Zyromski et al., 2020). Counseling researchers would benefit from scholarship with ACEs and trauma in advancing counseling practice and developing appropriate interventions.

Future research should explore diverse culturally rooted factors that can relate to the prevalence and impacts of ACEs and moderating roles in the relationship between ACEs and mental health outcomes. As the current investigation highlighted sex as a key moderator, future studies may consider sex and other diversity categories as a moderating variable, such as race/ethnicity, disability, national origin, religion, sexual orientation, and socioeconomic status in their studies about the prevalence, impacts, protective factors, and mechanisms of ACEs. For example, the C-ACE model emphasized race/ethnicity in the efforts to address race-based traumatic experiences among racial minority individuals, and more research on how diversity plays a critical role in experiencing and addressing ACEs would be valuable. Culturally-informed ACEs research will benefit marginalized youth from diverse backgrounds, such as youth with disabilities, from LGBTQ+ community, from immigration families, in foster care, in poverty, and in rural areas. Moreover, culturally-informed research on ACEs will add to the literature about the way the social-ecological risk and protective factors model may help explain the role of intersectional identity in the complex interactions between risk and protective factors from adolescent's social systems.

Counseling researchers are also encouraged to develop individual-, school-family-, and community-based intervention programs to deal with multiple and cumulative ACEs effectively. There is a growing interest in intervention efforts for addressing ACEs (Cameron et al., 2018; Gilgoff et al., 2020; Goldstein et al., 2020; Kirlic et al., 2020; McCoy et al., 2019). For example, previous studies regarding interventions and strategies for addressing the ACEs' effects focused on emotion regulation skills (Cameron et al., 2018) and motivational interviewing approach (Goldstein et al., 2020).

Nevertheless, significant future works are needed toward interventions for ACEs and investigation of the effectiveness of those interventions. A recent review article (Lorenc et al., 2020) from 27 studies that implemented interventions to support people exposed to ACEs concluded that most of the existing studies had not addressed harmful impacts of ACEs and social pathways which may mediate those negative consequences of ACEs. Additionally, there was a lack of studies that focused on community-level interventions and social or behavioral outcomes, while most studies focused on psychological interventions and mental health outcomes. Future research is recommended to implement family-, school-, community-level interventions and focus on social and behavioral outcomes with ACEs-informed, trauma-informed, and culturally-sensitive approaches.

The current study's design and results provide the basis for further exploration. As previously shown in table 2-2, the current study did not embrace school variables as risk or protective factors because of limited survey items. Researchers are recommended to incorporate the family-school-community framework and include school variables into the research questions related to adolescent internalizing behaviors under the social-ecological risk and protective factors model. Examples of school variables as risk factors may include peer abuse, victimization, bias-based harassment, academic failure, and having no good friends, while protective factors in the school setting may include peer support, teacher support, receipt of school counseling, school connectedness, school safety, and school climate.

Given the complex dynamic of the possible bidirectional association between parental aggravation and adolescent internalizing problems (i.e., anxiety, depression), more investigation is needed to debunk the 'chicken or egg' problem. A longitudinal

study design may be helpful to address the question, suggesting which side may precede the other. In addition, I proposed ‘learned helplessness’ as another theoretical framework in explaining the association of cumulative ACEs and depression. Researchers are recommended to consider the theory as a tool to broaden our understanding of the mechanism about how cumulative ACEs cause internalizing disorders, particularly depressive symptoms. A path model examining the mediating role of learned helplessness between ACEs and outcome is suggested for future research. Also, more research about family resilience will benefit counselors considering the mixed results about family resilience across the literature and the present study. More investigation is needed using a variety of measures and multi-informant approaches to the assessment of family resilience.

Strengths and Limitations of the Study

The current investigation has numerous strengths. One notable strength was adopting perspectives of counseling practice and counselor training in the examination of the relationship between cumulative ACEs and anxiety/depression. Also, the current study used a nationally representative sample of U.S. adolescents to address research questions, which brings greater generalizability to adolescent populations in the U.S. Another strength was that the present study focused on protective factors from family and community systems as well as sex as a moderator in the complex interactions between key variables. The social-ecological risk and protective factors framework in this study

was well suited to the research questions and left a potential for expanded use in the literature of ACEs and adolescent's mental health in future research.

Several limitations should be acknowledged despite the significant contributions that the current dissertation research project makes to the counseling practice and literature. Some methodological features of the 2018-2019 NSCH data may affect the reliability and validity of the study findings. The current investigation does not warrant a causal relationship between the predictive variables and outcome variables because the study design employed is cross-sectional, although the independent variable (i.e., cumulative adverse 'childhood' experiences) precedes the outcome variables (i.e., 'current' conditions of anxiety and depression) being time-based. The use of self-report measures reported by parents or guardians of the adolescents may involve response error and bias. For example, a possibility should be noted that caregivers might have underrated socially undesirable events or conditions, such as domestic violence, alcohol/drug abuse, or parental aggravation. It is also possible that the caregivers could not capture adolescents' conditions precisely, such as the level of engagement in community activities.

There are other issues regarding measurements that should be noted for precise interpretation. The current study included sex as a potential moderating variable, but the sex consisted of binary responses between male and female, instead of non-binary response options. In addition, because the item was responded by caregivers of adolescents, not by adolescents, the item might not have precisely represented adolescent perception of their socially constructed identities. It should also be noted that the NSCH did not follow the conventional ACE items (i.e., emotional and physical abuse/neglect),

which requires cautiousness in interpretation and comparison with findings of other ACEs studies.

This study adopted a cumulative index of ACEs (i.e., a sum score of ACEs) instead of examining independent effects of each ACE or patterns of ACEs rendering subgroups of adolescents. The use of the cumulative scores of ACEs maximizes convenience and efficiency in terms of analyses and interpretation; however, it does not capture heterogeneous impacts of independent or grouped ACEs. Given the existing literature that uncovered the specificity of ACEs in explanation of problem outcomes, the unique contribution of ACEs to adolescents' anxiety and depression will not be acknowledged in this study.

Conclusion

The current study confirmed the close relationship between cumulative ACEs and adolescent anxiety/depression and found statistically significant moderation effects of parental aggravation and community activities in the associations. Three-way interactions, such as among ACEs, family resilience, and sex and ACEs, parental aggravation, and sex, were found statistically significant for anxiety but not for depression. The current study's findings suggest that counselors working with adolescents with anxiety or depression are encouraged to consider ACEs-informed and sex-specific care. Results also indicate that it is critical to consider family- and community-based interventions to address adolescent anxiety and depression by maximizing the use of family and community resources. Furthermore, the current study

provides implications for counselor training with a focus on expanding education about ACEs' prevalence, impacts, protective factors, and interventions. Overall, this study contributes to the literature and counselor education as well as counseling practice with new findings related to the ways individual, family, and community factors serve as risk and protective factors for adolescent anxiety and depression.

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- 2021 KCA-IC 2021 Research Grant
Korean Counseling Association-International Chapter (KCA-IC)
- Title: Training-Related Retraumatization among Counseling Trainees: A Qualitative Exploration
- 2021 AERA “DivE In” Seed Grant Award
American Educational Research Association (AERA) Division E
- Title: Fear of Hate Crime among Racial Minority Students in Colleges: Scale Validation, Prevalence, and Correlates
- 2020 NARACES Outstanding Graduate Student of the Year Award
North Atlantic Region Association for Counselor Education and Supervision (NARACES)
- 2020 ACES Research Grant Award
Association of Counselor Education and Supervision (ACES)
- Title: Training-Related Retraumatization as a Mediator between Adverse Childhood Experiences and Traumatic Stress among Counseling Trainees

SELECTED PUBLICATIONS

- Hong, J. S., Choi, M. J., **Kim, I.**, Butler-Barnes, S., Mountain, S., & Voisin, D.R., (2021). Identifying Protective Factors in the Association Between Peer Victimization and Internalizing Symptoms of African American Adolescents in Four Chicago’s Southside Neighborhoods. *School Mental Health*.
- Kim, I.**, & Kim, N. (2021). Parental Perceived Need for Counseling for Adolescents’ Anxiety and Depression Symptoms: A Cross-Sectional Study. *Counseling Outcome Research and Evaluation*.
- Kim, I.**, Galvan, A. & Kim, N. (2021). Independent and cumulative Adverse Childhood Experiences and Adolescent Subgroups of Anxiety and Depression. *Children and Youth Services Review*.
- Joo, H., **Kim, I.**, Kim, S. Carney, J. V., & Chatters. S., (2020). Why Witnesses of Bullying Tell: Individual and Interpersonal Factors. *Children and Youth Services Review*, 113, 105198.
- Lee, H., **Kim, I.**, Jeong, J., & Nam, S. (2020) Adverse Childhood Experiences and the Associations with Depression and Anxiety in Adolescents. *Children and Youth Services Review*, 111, 104850.
- Carney, J. V., **Kim, I.**, Bright, D. J., & Hazler, R. (2020). Peer Victimization and Loneliness: The Moderating Role of School Connectedness by Gender. *Journal of School Counseling*, 18(8), n8.